Cosasco® Wireless Corrosion Monitoring System

Reference Manual

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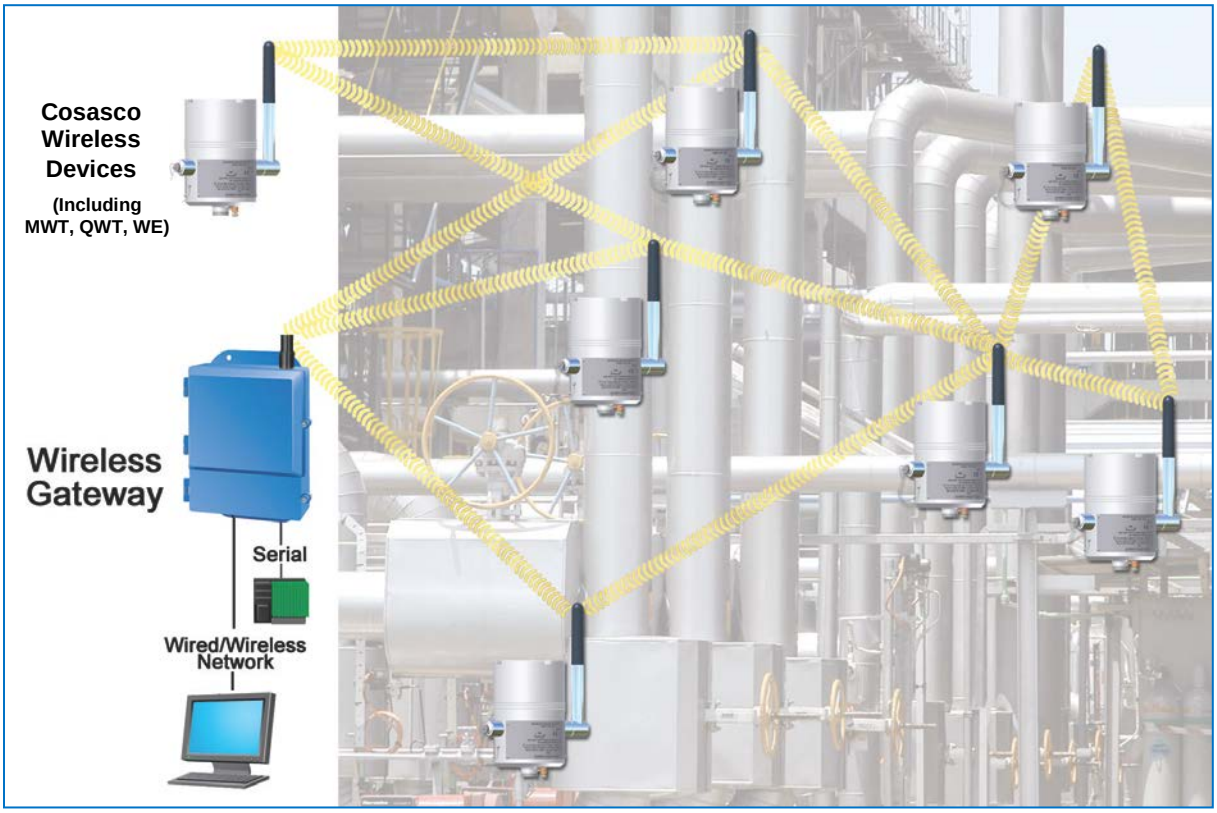
Chapter 1
Introduction

The Cosasco Wireless Corrosion Monitoring System is based on RCS's Microcor or Corrater technology. The Microcor will provide corrosion rates and metal loss for data in any process media at speeds approaching real time over a wireless network. The Corrater will provide corrosion rates and imbalanced pitting for data in aqueous based processes over a wireless network. Each Cosasco Wireless Device works as a node in a self-organizing network (mesh) to ensure consistent delivery of data. Secure and easily configurable, the self-organizing network ensures an adaptive and flexible approach to wireless data transfer.

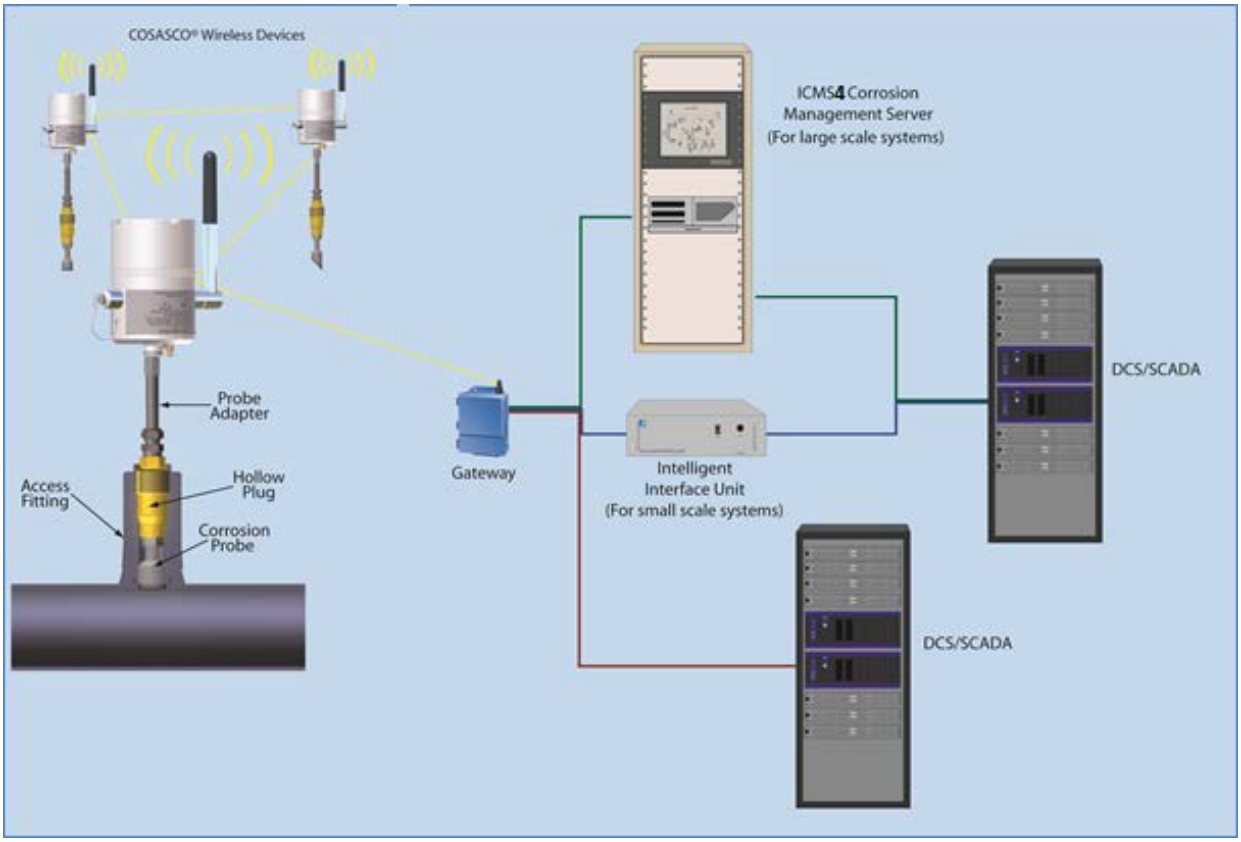
Unlike many approaches to in-plant wireless systems which require direct line-of-sight between the instrument and the communications gateway, the RCS approach ensures network integrity by allowing Cosasco Wireless Devices to communicate with each other. Because every device serves as a network connector there can be no single point of failure. In the event a temporary obstruction blocks a direct connection, the network automatically reroutes the signal to an adjacent device, ensuring network reliability and data integrity.

A network of Cosasco Wireless Devices can operate as an independent system or can integrate into your existing DCS/SCADA. RCS offers the ICMS4™ Corrosion Management Systems for larger scaled systems with Corrdata Live software. For smaller scale systems RCS offers the Intelligent Interface Unit (see diagrams on next page).

The scope of this manual is to cover all the necessary equipment and settings required to connect your Cosasco Wireless Devices to an Emerson smart wireless gateway. If this manual is followed completely you will have the necessary instruction to add your Cosasco Wireless Devices to an existing Emerson network, or start your own network. This manual will not cover the connection of any equipment outside of RCS equipment, nor will it cover settings not used by RCS equipment. If you wish to learn more about your Smart Wireless Gateway and how it can operate with other devices, please reference the Emerson Gateway Manual contained on the CD that was included with the Gateway.



A network of Cosasco Wireless Devices as an independent system



A network of Cosasco Wireless Devices shown integrated into ICMS3, IIU, or directly to a DCS/SCADA System

Chapter 2
Required Equipment

The following lists the equipment required to correctly setup and run a network of Cosasco Wireless Devices.

PC must meet the following requirements:
Operating System Requirements:

- Windows 2000, service pack 4
- Windows Server 2003 or newer
- Windows XP (Home or Professional), service pack 1 or higher (If the operating system requirement is not met, the setup will display a message and stop).
- Windows 7
- Windows 8

Applications:

- Internet Explorer 6.0 or higher
- Mozilla Firefox 1.5 or higher
- Sun Microsystems™ Java™ Runtime 1.4.1 (or newer)

If the user manual is being installed, the following application is also required:

- Adobe® Acrobat® 5.0 (or newer)

If the Network Assistant or OPC Proxy Setup utilities are being installed, the following application is also required:

- .NET Framework 2.0

If any of the above requirements are not met, the setup disc will install the following:

- Internet Explorer 6.0 service pack 1
- Sun Microsystems™ Java™ Runtime 1.5.0_10
- Adobe® Acrobat Reader® 8.0
- .NET Framework 2.0

Hard disk space Requirements:

- Maximum installation (including all upgrades performed by the setup disc): 250 MB

Typical installation (all features, but none of the above installed): 35 MB

Hardware Requirements:

- Ethernet port framework 2.0
- Crossover Cable
- Cosasco Wireless Device
- Cosasco Wireless Device Power Module
- R-1420 Gateway
- 24Vdc Power Supply

Chapter 3
Gateway Pre-Configuration

Required Equipment

- ✓ 24Vdc power supply
- ✓ R-1420 Gateway
- ✓ PC with matching requirements
- ✓ Ethernet Crossover Cable

The first step in setting up a network of Cosasco Wireless Devices is to configure the Gateway. This chapter explains how to setup a completely new network of Cosasco Wireless Devices and Gateway. If you have an existing network of Cosasco Wireless Devices and Gateway and will be adding Cosasco Wireless Devices to an existing network, skip to Chapter 4.

PC Initialization

To configure the Gateway a local connection between a PC/Laptop and the Gateway need to be established.

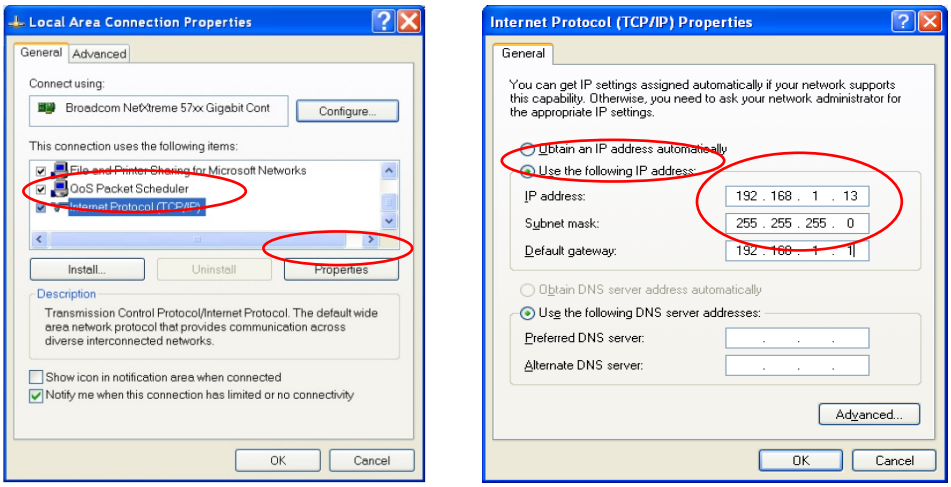
1. Connect the 24 VDC supply to the Gateway, and the "crossover" network cable into the Ethernet 1 socket (right hand RJ45 Ethernet port viewed from bottom of 1420), and into the network port on the laptop/PC. Only use the right hand network socket on the Gateway that has been set to a TCP/IP address of 192.168.1.10. Once the crossover cable is connected, the network connection will take a couple of minutes to initialize.

2. The PC/laptop address and host settings need to be changed manually using the following procedure for Internet Explorer on Windows. The procedure for other operating systems and web browsers may vary slightly:

    a. On the PC/laptop, install the Java Plug-in found on the Disk 1 CD provided with the Gateway. The Plug-in can also be found at http://java.com/

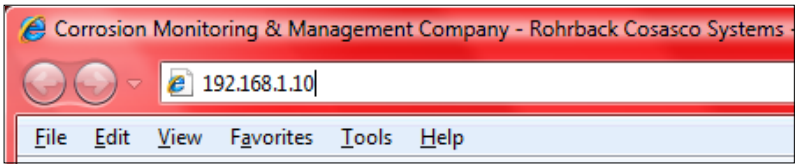
b. To Establish the PC/Laptop settings navigate to **Start>Control Panel>Network Connections**.

1. Select **Local Area Connection**.
2. Right click to select **Properties**.
3. Select **Internet Protocol (TCP/IP)**; then click the **Properties** button
4. Select the **Use the following IP address** button and set **IP address** to 192.168.1.13
5. Set the **Subnet Mask** to 255.255.255.0
6. Set the **Default Gateway** to 192.168.1.1.
7. Leave **DNS** fields blank.
8. Select **OK** for both the **Internet Protocol (TCI/IP) Properties** window and the **Local Area Connection Properties** window.


Local Area Connection Properties
General
Advanced
Connect using:
Broadcom NetXtreme 57xx Gigabit Cont
Configure...
This connection uses the following items:
File and Printer Sharing for Microsoft Networks
QoS Packet Scheduler
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
Notify me when this connection has limited or no connectivity
OK
Cancel
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 1 . 13
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
192 . 168 . 1 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

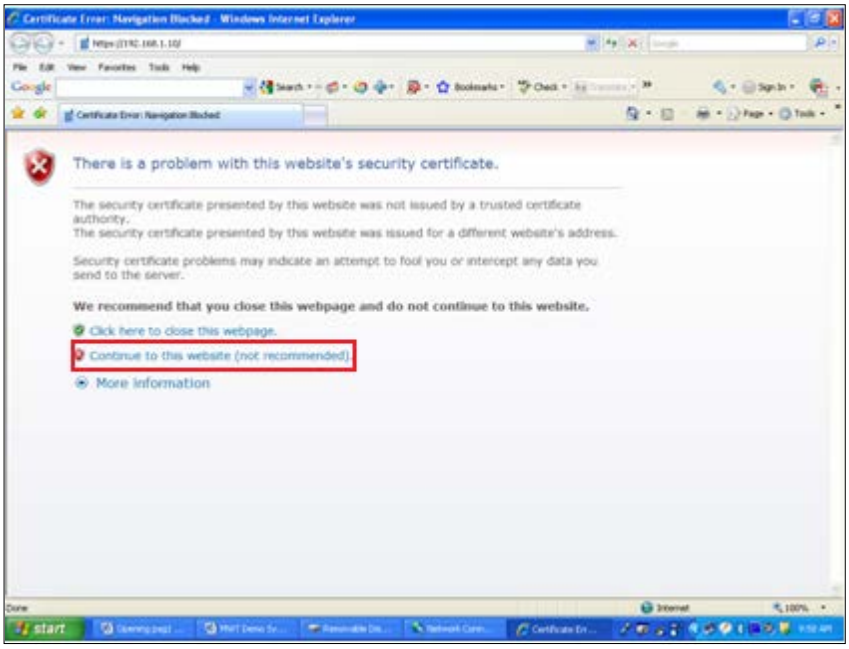
PC network settings screens

3. To access the web server page for the Gateway, launch Internet Explorer and enter **192.168.1.10** in the address bar.



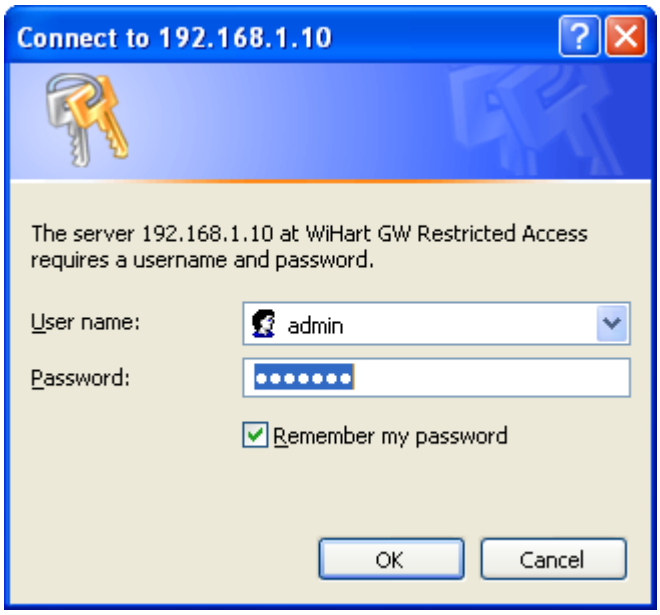
Address bar screen

4. Due to default settings on the PC the first page will show a security warning. Click on **Continue to this website (not recommended)** to continue.


There is a problem with this website's security certificate.
The security certificate presented by this website was not issued by a trusted certificate authority.
The security certificate presented by this website was issued for a different website's address.
Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server.
We recommend that you close this webpage and do not continue to this website.
Click here to close this webpage.
Continue to this website (not recommended).
More information

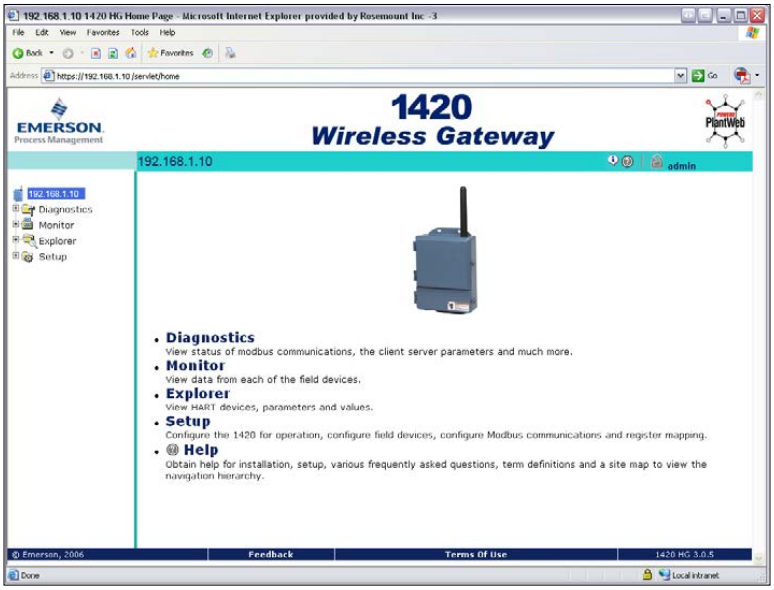
Security Warning screen

5. You will then be prompted by a login screen. The User name and Password have been preset for convenience. However, if the entries get removed or changed the User name is "admin" and the password is "default." Click **OK** to continue.



Login screen

The web server home page will automatically open.



Home page screen

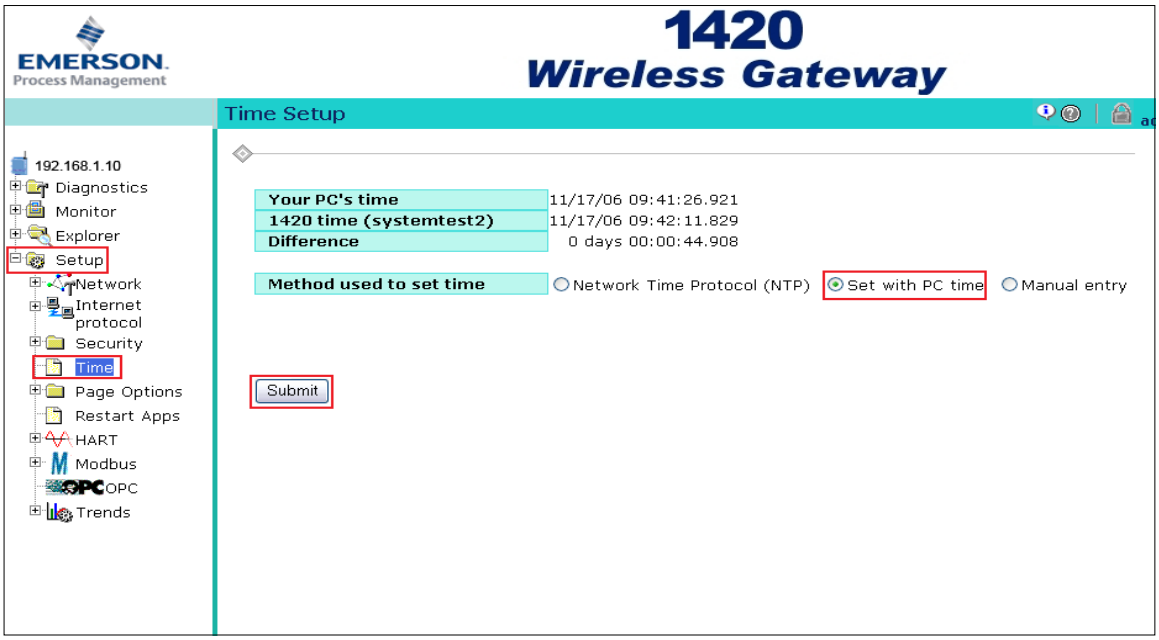
Gateway Configuration

1. Password setup
   a. Click **Setup>Security>User Accounts** to change the Gateway passwords. These passwords allow for varying levels of application access. The administrator can modify any system or field device setting. In contrast, the operator is only able to modify some parameters. Use caution when changing the administrator password. If the administrator password is lost, you will not be able to continue with the Gateway setup.

   Note: A hard reset is available if the password is lost or an error occurs during programming. Please contact RCS technical support for assistance.

Password Edit screen

2. Time and Date setup
   a. On the left hand side menu select **SETUP** then **TIME**
   b. Select the option to **set with PC time**
   c. Then click on **Submit**



Time setup Screen

IP configuration

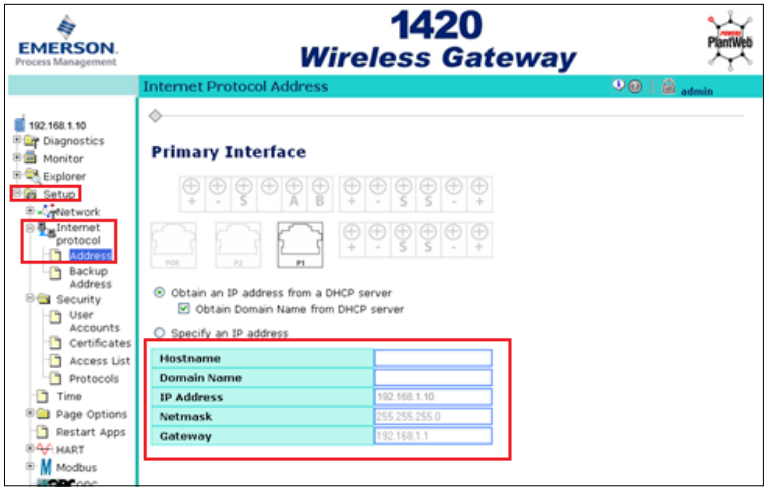
IT/Process Control Network Administrator or Technician can provide the following:

Prior to the gateway being installed and connected to a live control network, it should be configured with an IP address as well as other TCP/IP network settings.

Required information

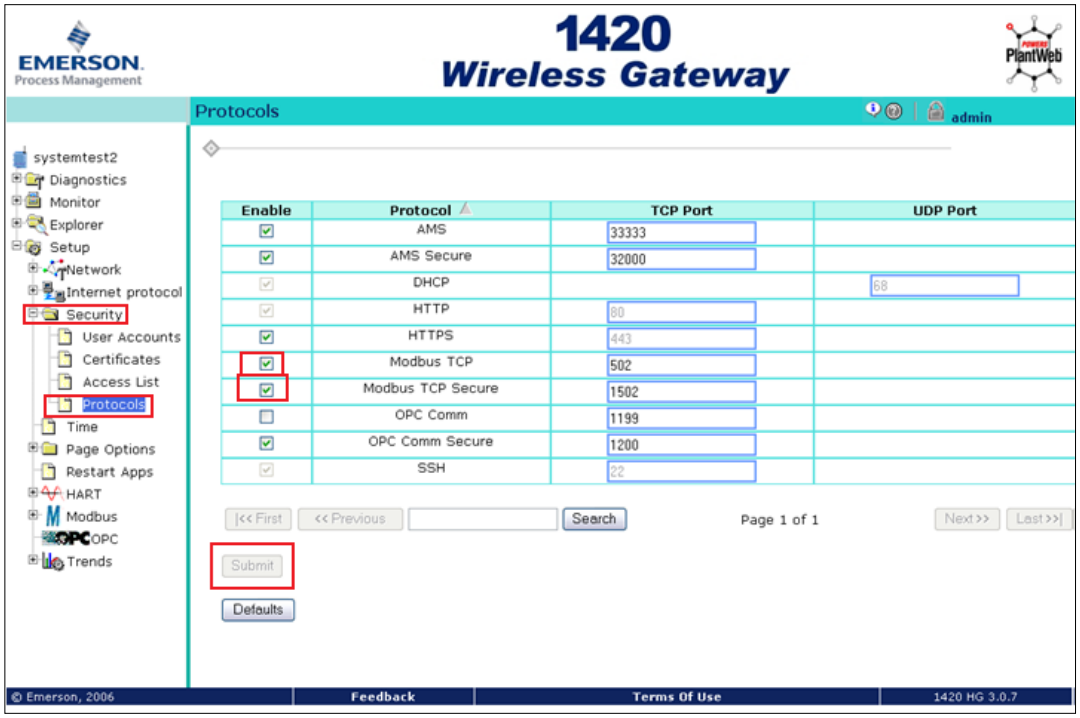
- Specify an IP address, or use a DHCP server
- Hostname
- Domain Name
- IP address
- Netmask
- Gateway

1. Configure Gateway Ethernet IP settings
   a. Access the Gateway with Administrator access
   b. Navigate to **Setup>Internet Protocol>Address**
   c. Enter configuration information determined above
   d. To complete configuration without a firewall, click **Submit** and proceed with Gateway Restart when prompted.



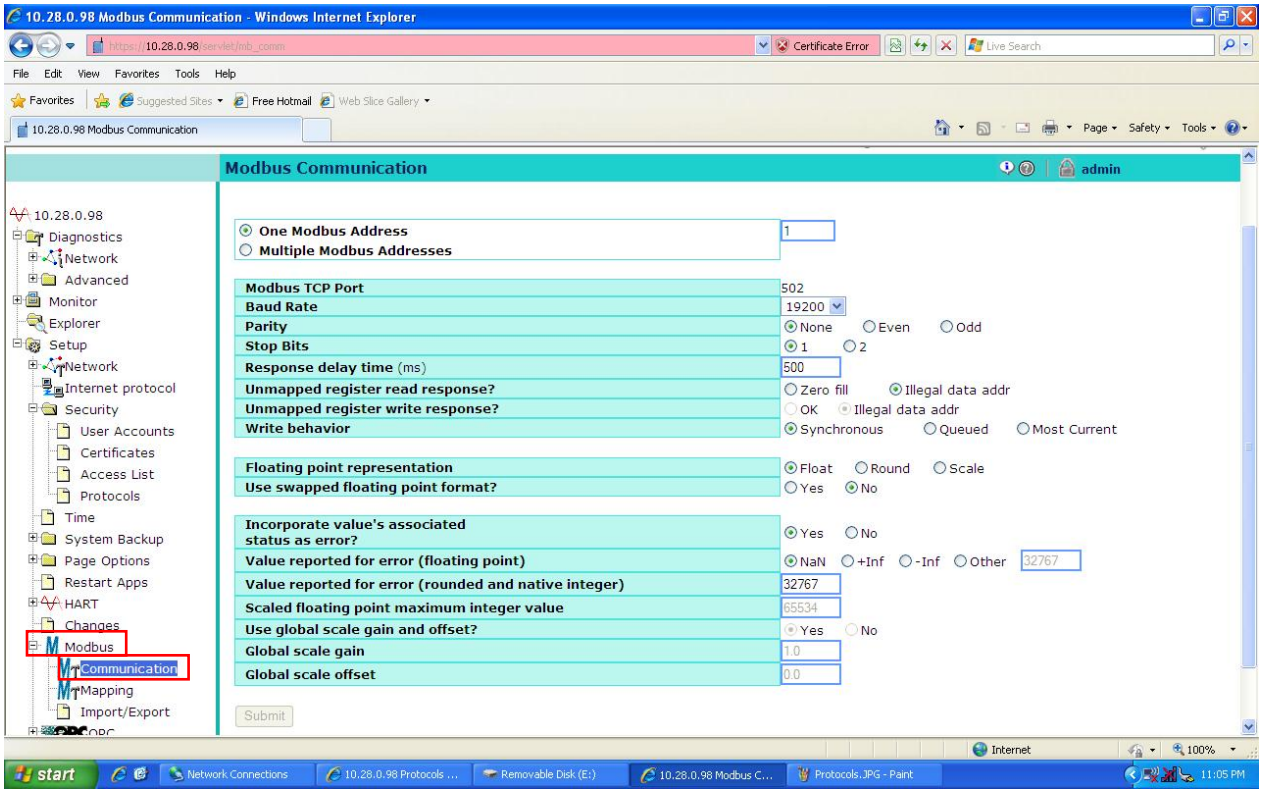
Internet Protocol Address screen

2. Configure the Gateway for an Ethernet Network with a firewall by performing the following steps:
   a. Navigate to **Setup>Security>Protocols**
   b. Click to enable **Modbus TCP** and disable **Modbus TCP Secure** security protocols
   c. Click **Submit** and proceed with Gateway Restart when prompted.



Protocols screen

3. Configure the Gateway Modbus settings
   a. Access the Gateway Web Interface with Administrator access
   b. Navigate to **Setup>Modbus>Communication**
   c. Configure the Gateway Modbus Communication settings to match below
   d. Click **Submit** and proceed with Gateway Restart when prompted

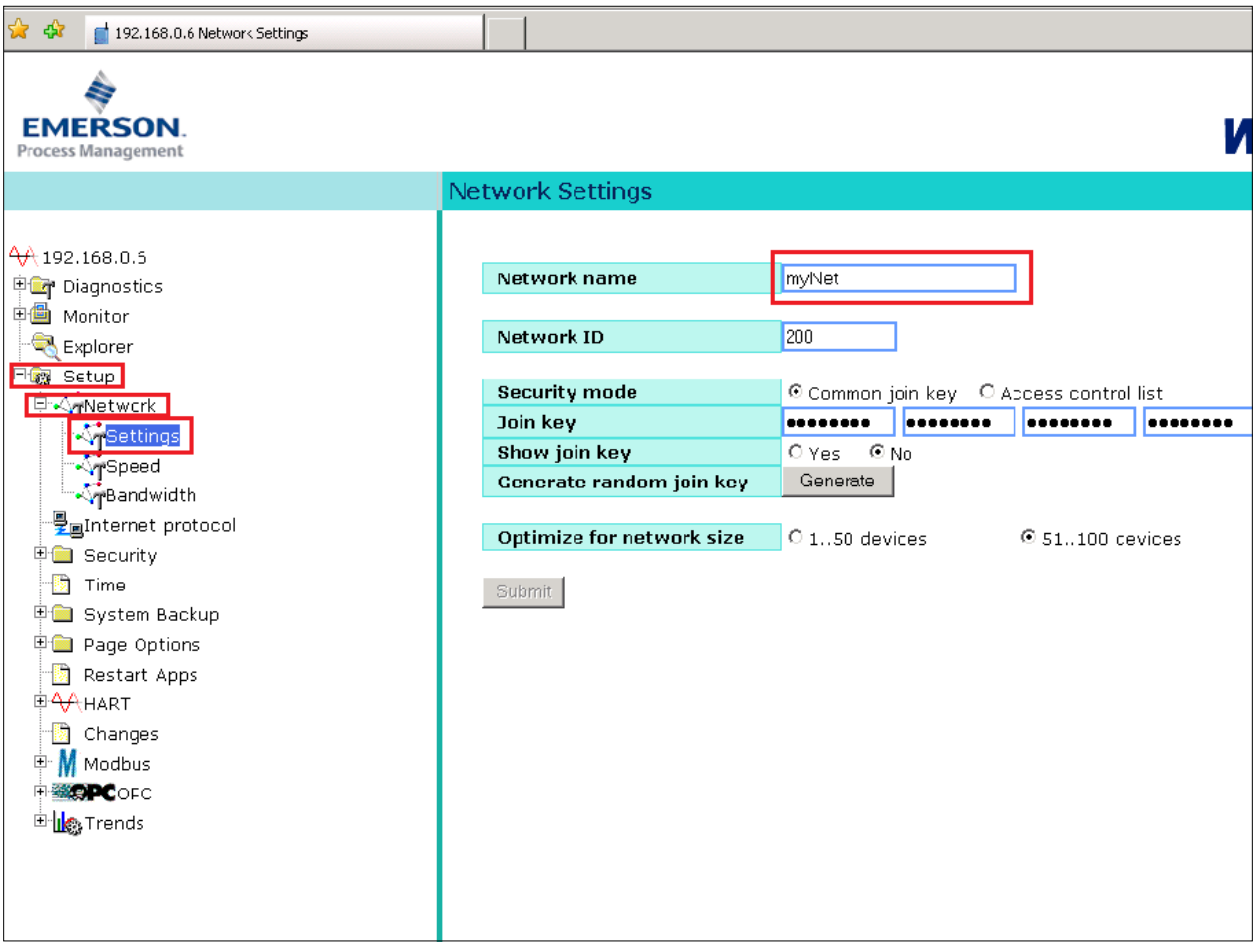


Modbus Communications screen

Network Identification and Join Key Setup

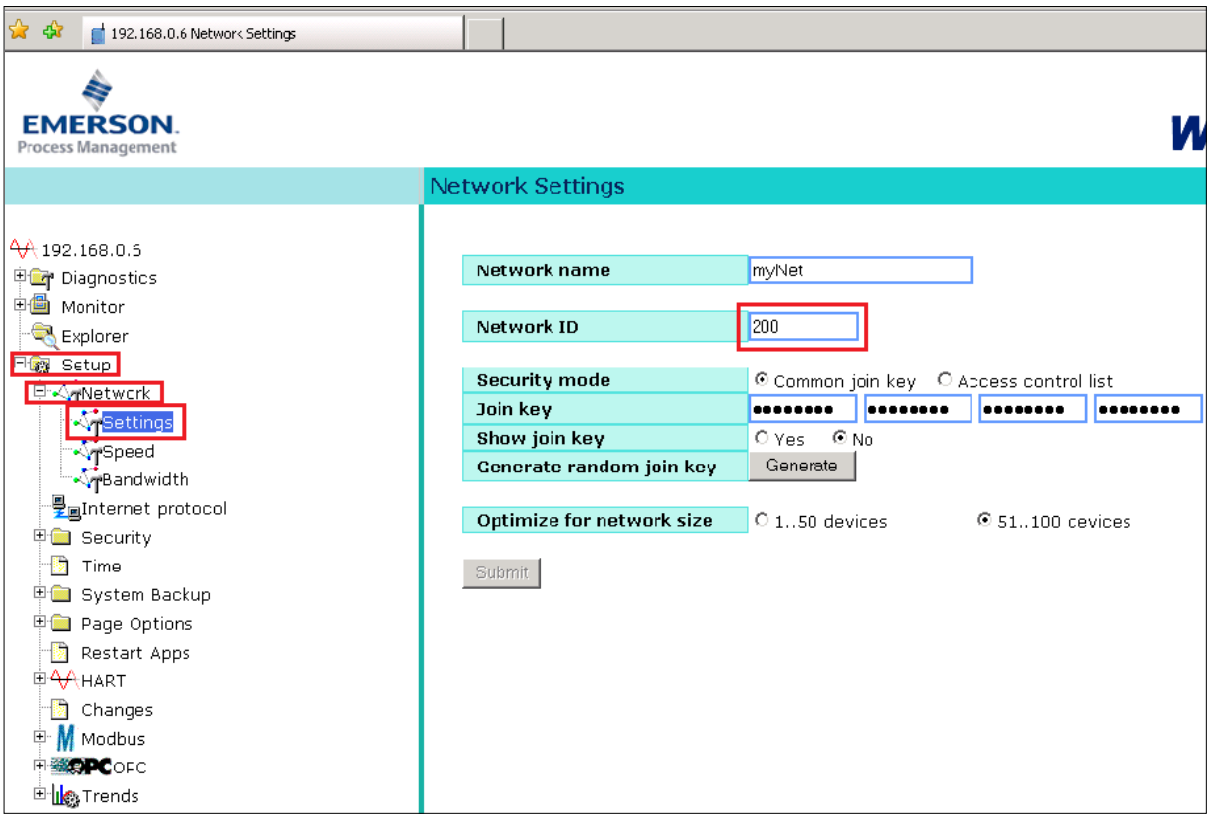
Note: please follow this section step by step out to avoid any problems or future complications

1. Configure Gateway Network Name
   a. Access the Gateway with Administrator access
   b. Navigate to **Setup>Network>Settings**
   c. Enter **Network Name** only, determined prior to starting setup.
   d. To complete configuration, click **Submit.**



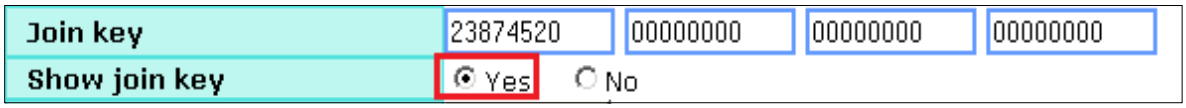
Network Settings (highlighting Network name) screen

2. Configure Gateway Network ID
   a. Access the Gateway with Administrator access
   b. Navigate to **Setup>Network>Settings**
   c. Enter **Network ID** only, determined prior to starting setup. Network ID should be unique to any other Gateways that may be currently installed
   d. To complete configuration, click **Submit**.



Network Settings (highlighting Network ID) screen

3. Configure Gateway Network Join Key
   a. Access the Gateway with Administrator access
   b. Navigate to **Setup>Network>Settings**
   c. Select the **Yes** indication next to **Show join key** this will allow you to view the join key as you enter it.
   d. Enter Network **Join key** only, determined prior to starting setup.
   e. To complete configuration, click **Submit**



Join Key screen

Note: At this point you will need to complete the MWT setup before you can complete the gateway setup.

Chapter 4
MWT-3905 (Microcor®) and MWT-3905-QS (Quicksand™)

Note: All references to the MWT are applicable to the MWT-3905-QS (Quicksand) Wireless Transmitters hereafter unless otherwise noted.

Once you have completed the pre-configuration of the Gateway you can program and add-in MWT's to the network using RCS's Wireless Tools Software on the CD included with the Installation Kit.

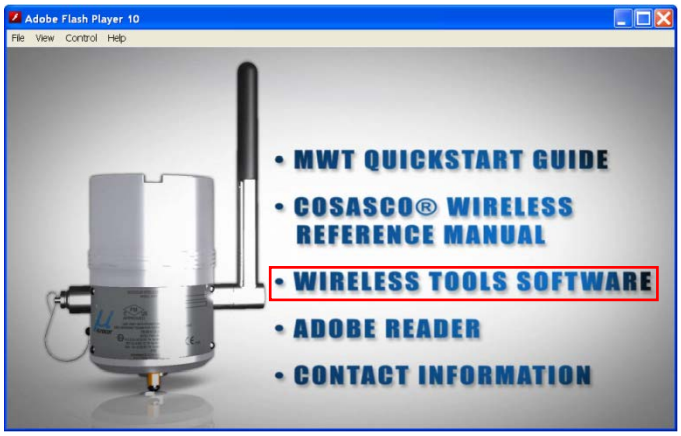
Programming the MWT with Wireless Tools PC Software

Preset check list

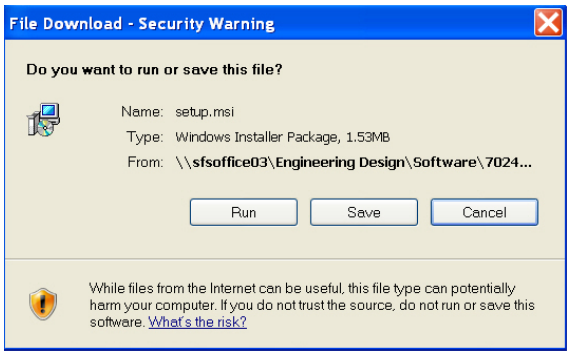
- ✓ Be sure the power module is installed in the MWT prior to start of programming.
- ✓ Connect the communication cable (748110-9A) to both the computer and the MWT.
- ✓ If using USB to RS232 adapter, be sure to install supplied drivers by the manufacturer.
- ✓ Install Wireless Tools Software.

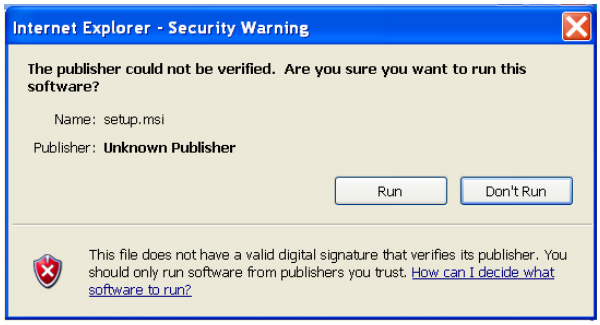
*****Important: To preserve battery life, please ensure that the power module is removed from the MWT if it is not in use or connected to a Gateway.*****

1. Install Wireless Tools Software
   a. Insert the Setup and Installation CD that was included with the MWT Installation Kit provided with the MWT.
   b. Click **Wireless Tools Software** to install

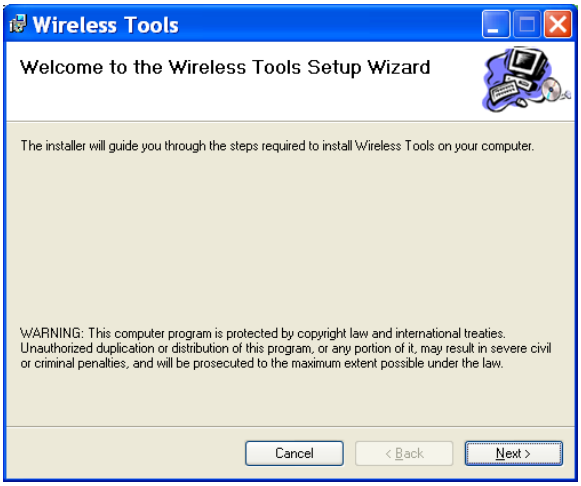


c. A security warning window may appear. If so, click **Run**. Another Security warning window will appear. Click **Run** again.

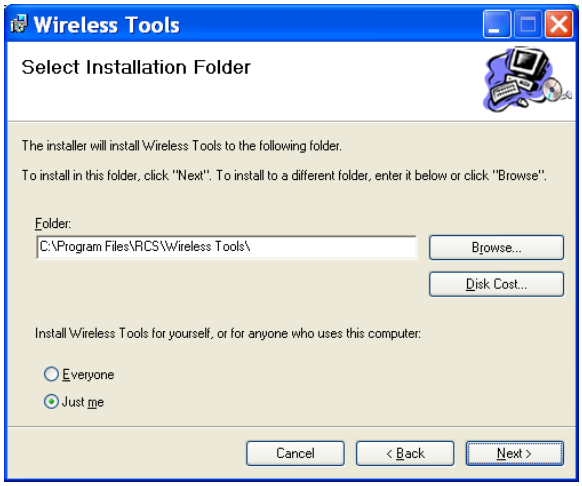

File Download - Security Warning
Do you want to run or save this file?
Name: setup.msi
Type: Windows Installer Package, 1.53MB
From: \\sfsoffice03\Engineering Design\Software\7024...
Run
Save
Cancel
While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?


Internet Explorer - Security Warning
The publisher could not be verified. Are you sure you want to run this software?
Name: setup.msi
Publisher: Unknown Publisher
Run
Don't Run
This file does not have a valid digital signature that verifies its publisher. You should only run software from publishers you trust. How can I decide what software to run?

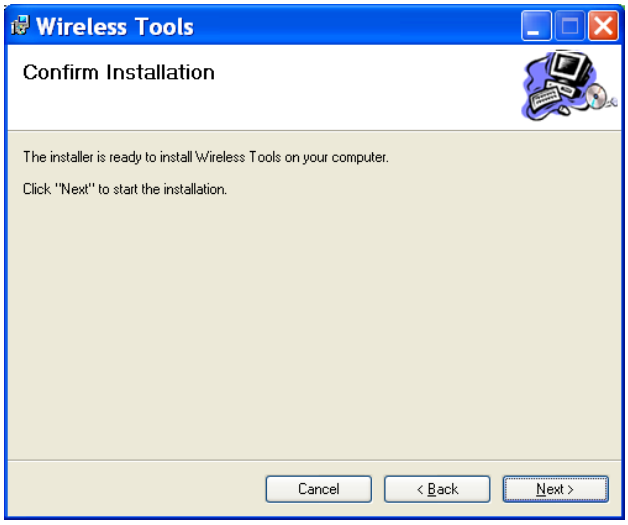
d. The Wireless Tools Setup Wizard window will appear. Click **Next** to begin installation.


Wireless Tools
Welcome to the Wireless Tools Setup Wizard
The installer will guide you through the steps required to install Wireless Tools on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

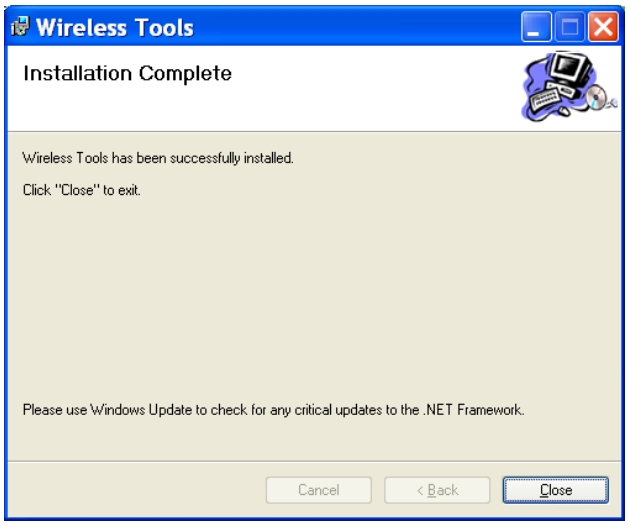
e. Click **Next** after selecting the Install directory (Default directory is recommended).


Wireless Tools
Select Installation Folder
The installer will install Wireless Tools to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files\RCS\Wireless Tools\
Browse...
Disk Cost...
Install Wireless Tools for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

f. Click **Next** to Confirm Installation.


Wireless Tools
Confirm Installation
The installer is ready to install Wireless Tools on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

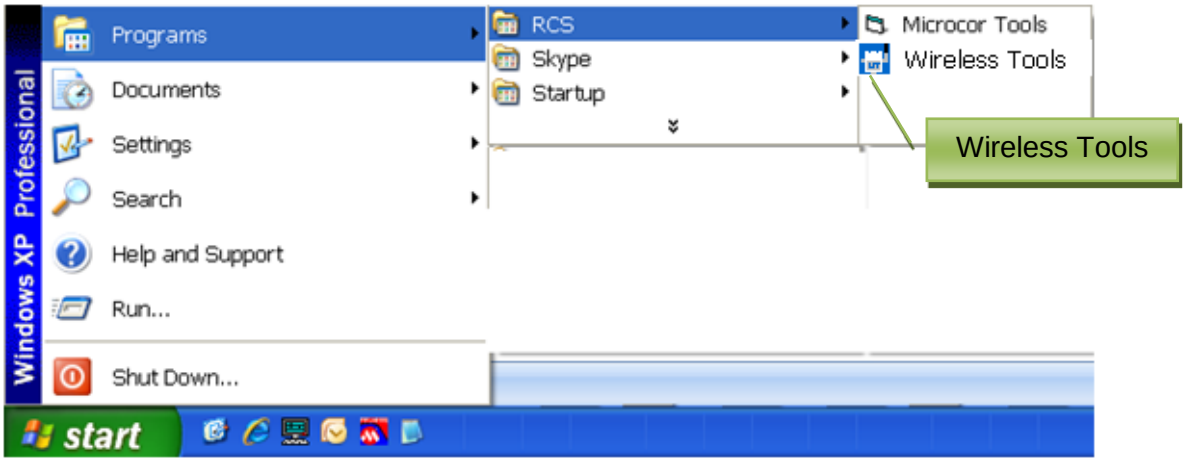
g. Click **Close** to Complete Installation.


Wireless Tools
Installation Complete
Wireless Tools has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

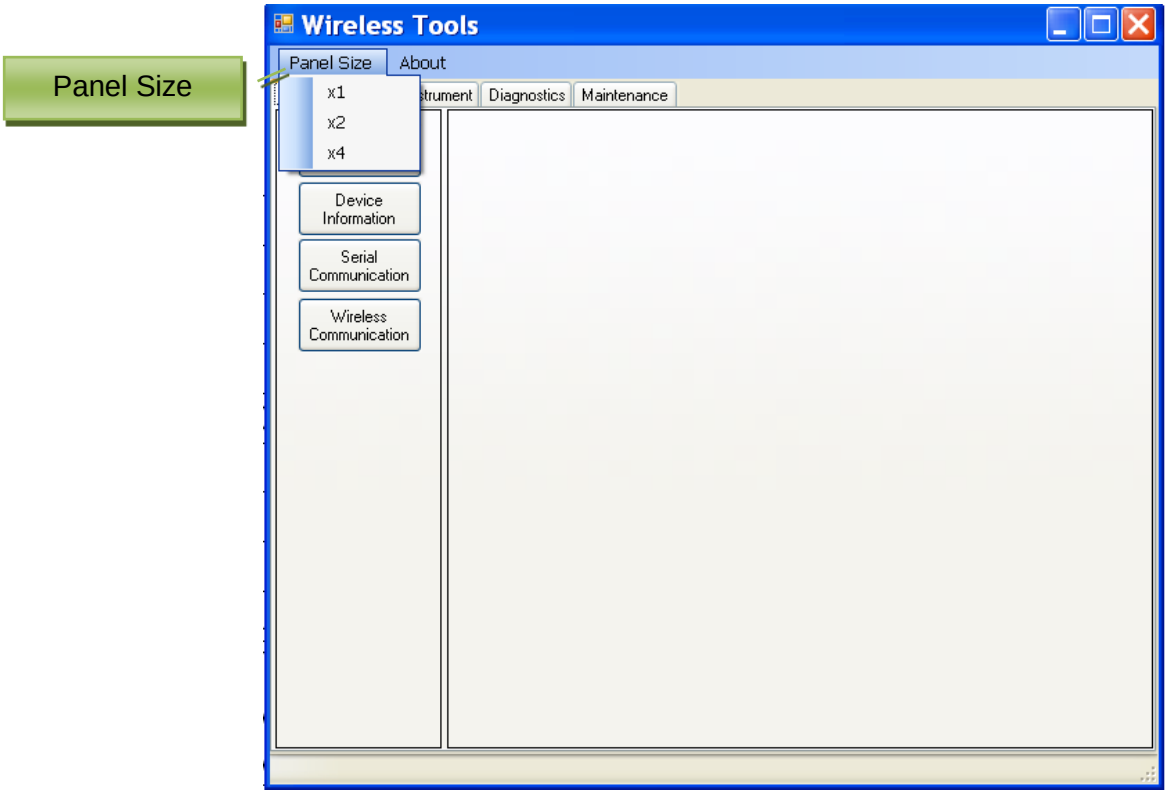
2. Run Wireless Tools

a. Click the **Wireless Tools** icon on your desktop or in the RCS folder of your Start Menu Programs list.

Or

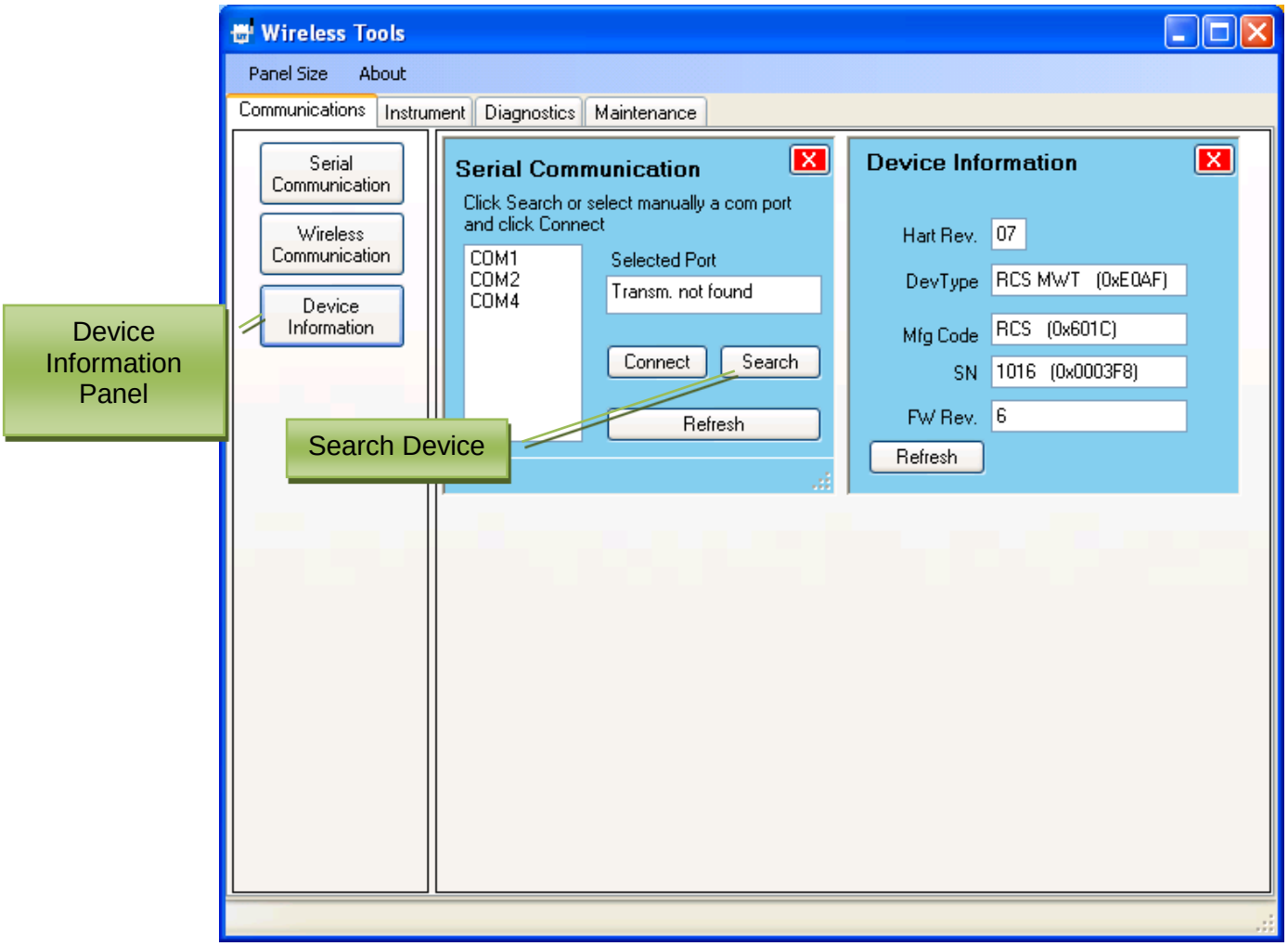


b. Click on **Panel Size** to set your display preference. This Manual will demo the x4 size.



3. Communications (Required Step)

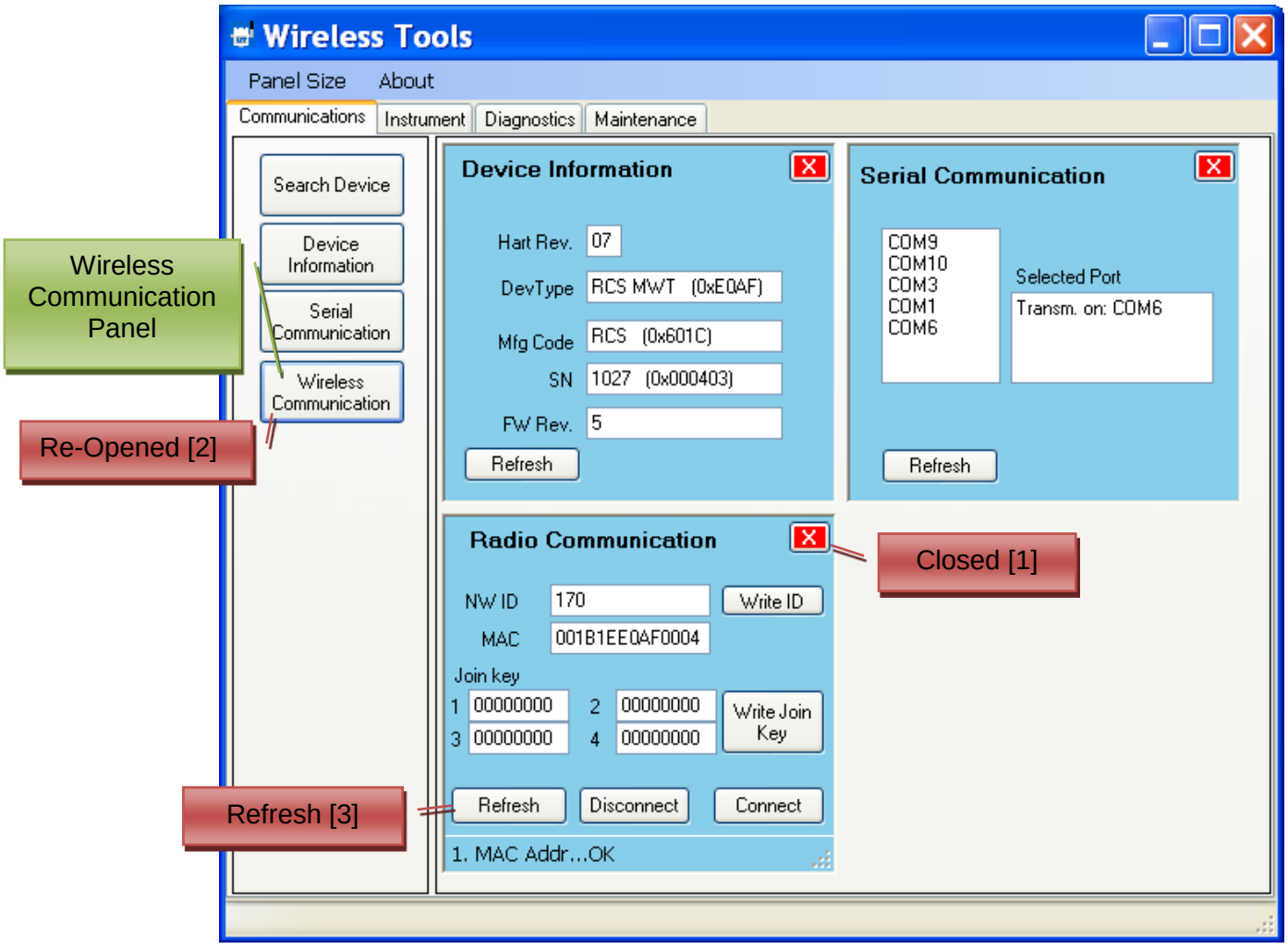
a. Click **Search Device** button to auto-detect communications port of connected MWT. The option to manually choose a com port is also available. The Device Information commands used include: The Hart Revision, Device Type of the Instrument, Manufacturer's Code, Serial Number, and the Firmware Revision of the Device. The Device Information is Read Only.



b. Click **Wireless Communication** button to configure the Network ID (NW ID) and Join Key of your connected MWT. A special sequence is required for doing this configuration:

1. Click **Disconnect** and wait until the status bar shown on the bottom of the panel indicates the end of the command.
2. Input NW ID and click **Write ID**
3. Input Join Key and click **Write Join Key**
4. Click **Connect** and wait until the status bar shown on the bottom of panel indicates that connect is OK. Click **Refresh** to verify NW ID. Join Key cannot be checked.

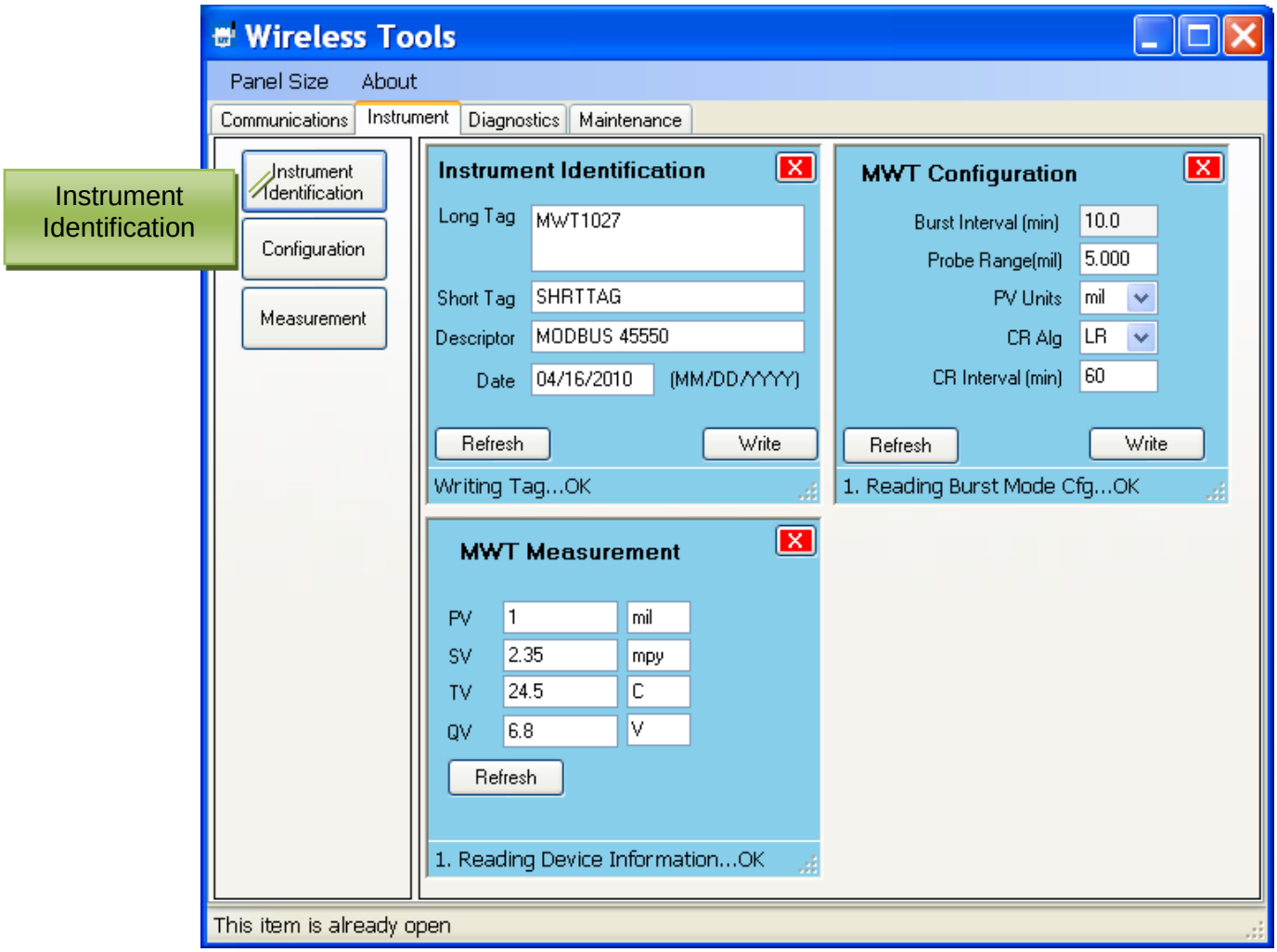
To verify MWT/Wireless Gateway communication: Refer to Chapter 5 Section 1 or see Chapter 6 for join verification with Gateway Interface.



Important: If any panel is closed[1] and re-opened[2], the Refresh[3] button must be clicked to ensure the most recent information is displayed.

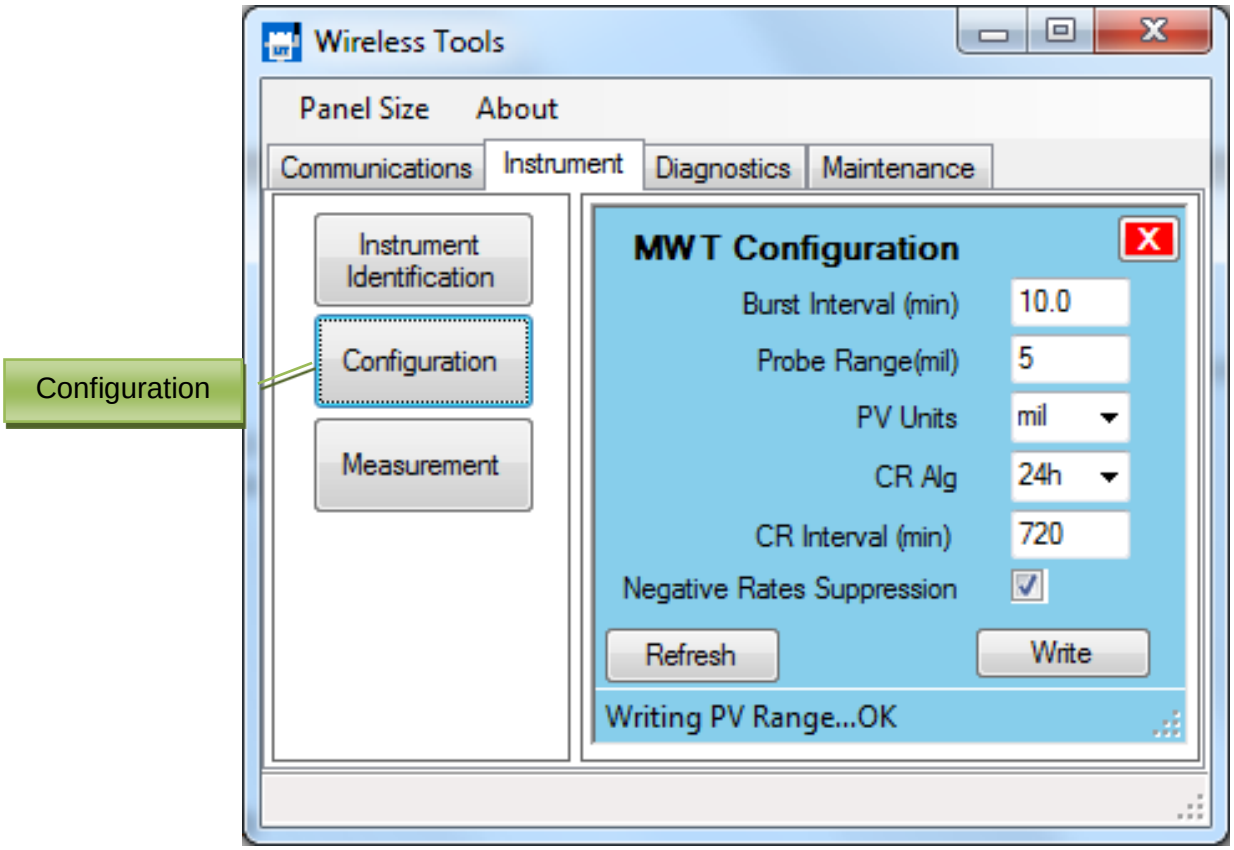
1. **Instrument**
   a. Click **Instrument Identification** button to read and write Information to the connected MWT. The Instrument Identification commands used include: The Long Tag, Short Tag, Descriptor, and Date. The Instrument commands can be configured on the Wireless Gateway interface also. A good practice for recognizing connected devices is labeling them properly (Location, Serial Number, etc.).

      1. **Long Tag**: The default value of the Long Tag is MWTxxxx, where xxxx is the Serial Number of the unit. The Long Tag can be modified to 32 characters but must be unique inside the wireless network.
      2. **Short Tag**: The default value of the Short Tag is blank. The Short Tag can be modified to 8 characters.
      3. **Descriptor**: The default value of the descriptor is blank. The Descriptor field can be 16 characters long and used for any type of description a user may need.
      4. **Date**: Manually enter the date (mm/dd/yyyy). This field can store any date the user requires.



b. Click **Configuration** button to configure Burst Interval (Measurement Interval), Probe Range, Primary Variable Units, Corrosion Rate Algorithm, and Corrosion Rate Interval. The Configuration panel is read and write enabled.

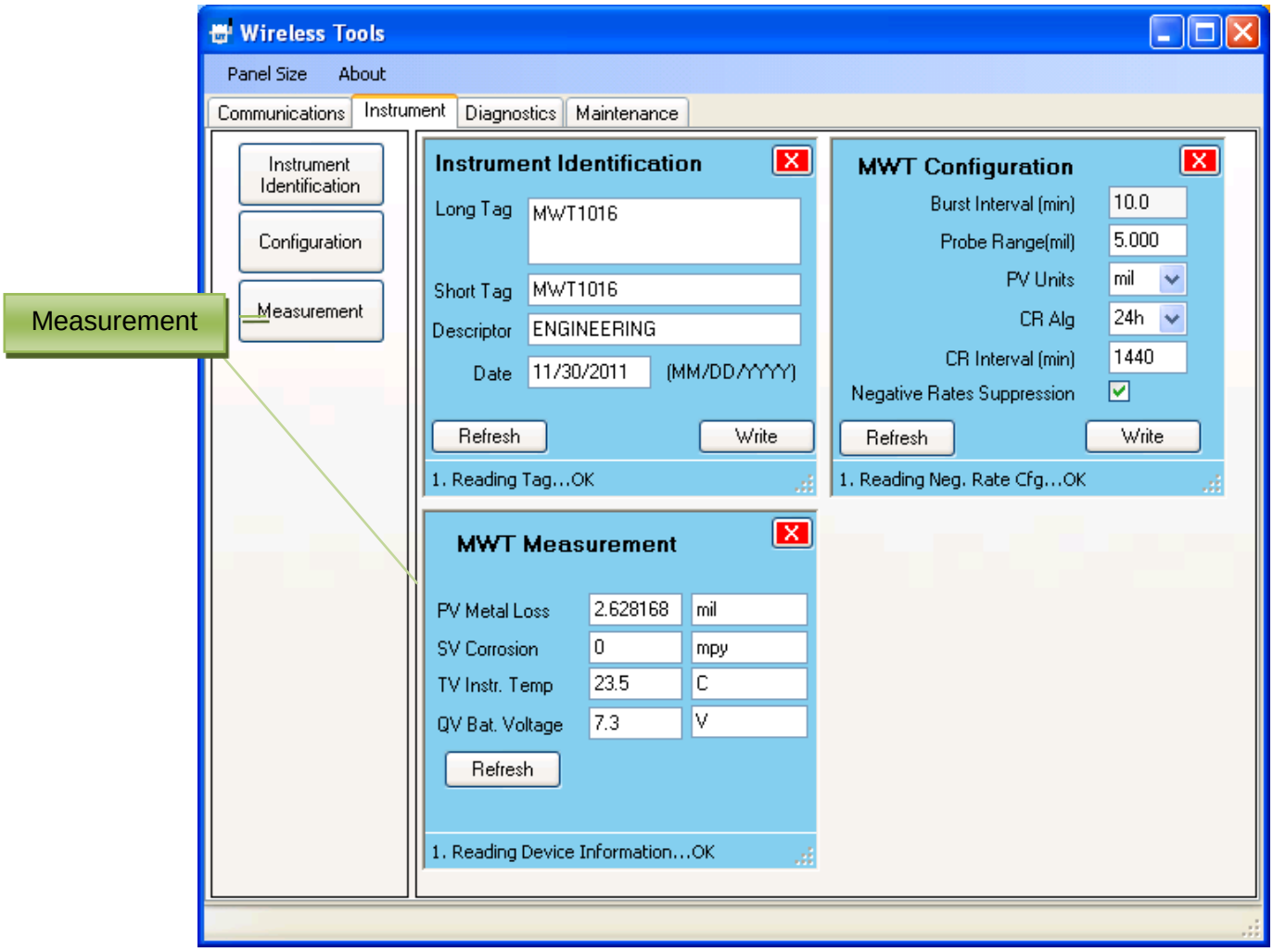
1. **Burst Interval**: Configures the interval in which the MWT's transmit measurement data to the Gateway. For initial setup, the burst interval should be set to 2 minutes. A burst rate of 2 minutes will allow multiple readings to be taken in a short amount of time to allow for faster system setup. Burst rate should be changed to an interval of 10 minutes or more (RCS does not recommend a time interval below 10 minutes.) either through the Checkmate DL-W or through the Gateway Web Server. Input value must be an integer between 10 and 60.
2. **Probe Range**: Configures the span of the probe in mils. Span is displayed on actual Probe.
3. **Primary Variable Units**: Metal Loss in mils or microns.
4. **Corrosion Rate Algorithm**: Configuration allows data to be calculated in Linear Regression or 24 Hour filter Algorithm. The MWT's are configured to 24Hr filter by with an additional 12hr filter by default. Please refer to RCS Application notes for case by case applications on CR algorithms.
5. **Corrosion Rate Interval**: Configures the interval in which the MWT's will calculate Corrosion Rate Algorithm.
6. **Negative Rate Suppression**: By default, the MWT's are enabled with Negative Rate Suppression.



c. Click **Measurement** button to read all dynamic variables. The variables used include Primary, Secondary, Tertiary, and Quaternary. The variables are read only.

Note: Valid readings will appear after 1 measurement interval.

1. **PV (Primary Variable)**: Metal Loss in mils or microns.
2. **SV (Secondary Variable)**: Corrosion Rate in mils per year or microns per year.
3. **TV (Tertiary Variable)**: Instrument Temperature in deg C.
4. **QV (Quaternary Variable)**: Battery Voltage in Volts.



Chapter 5
CWT-9020 (Corrater®)

Once you have completed the pre-configuration of the Gateway you can program and add-in CWT's or MWT's (Chapter 4) to the network using RCS's Wireless Tools Software on the CD included with the Installation Kit.

NOTE: If Wireless Tools is installed already, skip step one below.

Programming the CWT with Wireless Tools PC Software

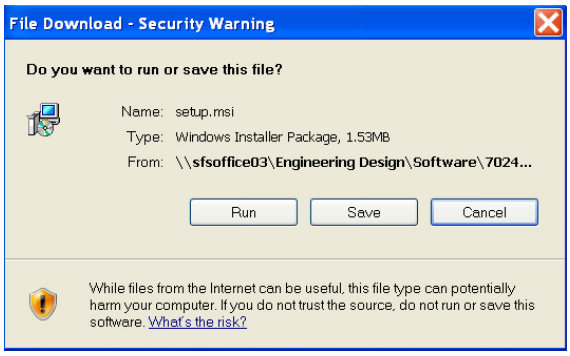
Preset check list

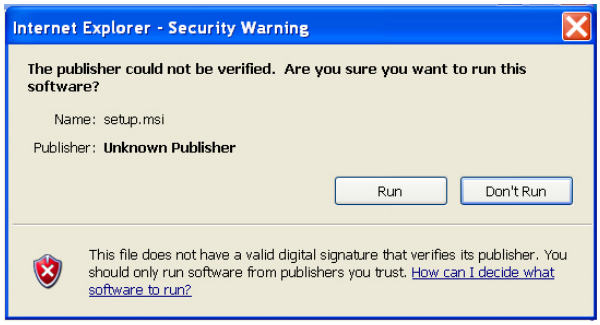
- ✓ Be sure the power module is installed in the CWT prior to start of programming.
- ✓ Connect the communication cable (748110-9A) to both the computer and the CWT.
- ✓ If using USB to RS232 adapter, be sure to install supplied drivers by the manufacturer.
- ✓ Install Wireless Tools Software.

*****Important: To preserve battery life, please ensure that the power module is removed from the CWT if it is not in use or connected to a Gateway.*****

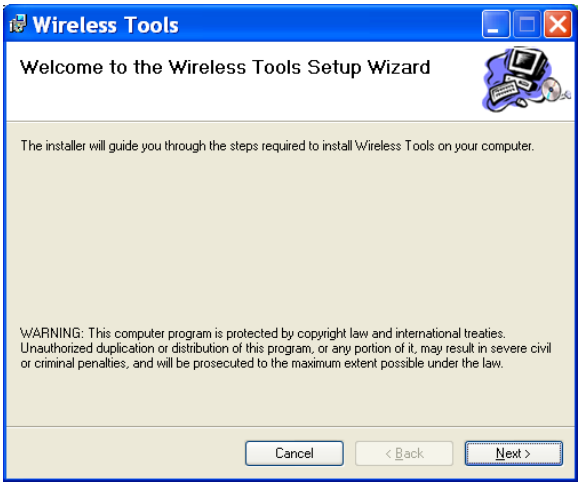
1. Install Wireless Tools Software
   h. Insert the Setup and Installation CD that was included with the MWT Installation Kit provided with the MWT.
   i. Click **Wireless Tools Software** to install

j. A security warning window may appear. If so, click **Run**. Another Security warning window will appear. Click **Run** again.

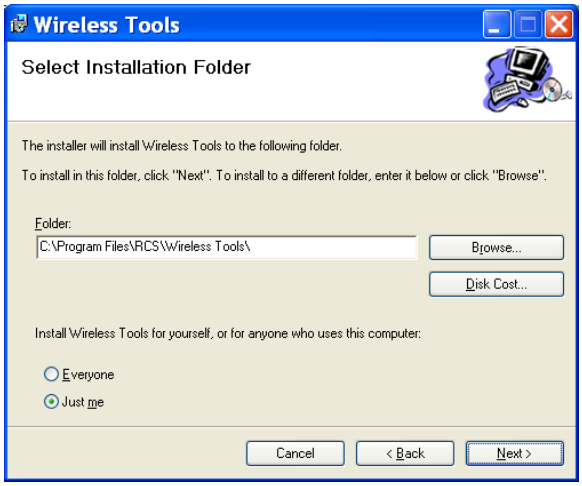

File Download - Security Warning
Do you want to run or save this file?
Name: setup.msi
Type: Windows Installer Package, 1.53MB
From: \\sfsoffice03\Engineering Design\Software\7024...
Run
Save
Cancel
While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?


Internet Explorer - Security Warning
The publisher could not be verified. Are you sure you want to run this software?
Name: setup.msi
Publisher: Unknown Publisher
Run
Don't Run
This file does not have a valid digital signature that verifies its publisher. You should only run software from publishers you trust. How can I decide what software to run?

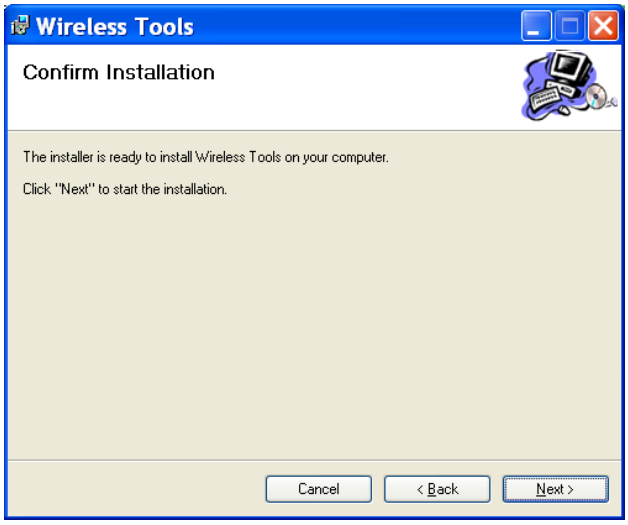
k. The Wireless Tools Setup Wizard window will appear. Click **Next** to begin installation.


Wireless Tools
Welcome to the Wireless Tools Setup Wizard
The installer will guide you through the steps required to install Wireless Tools on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

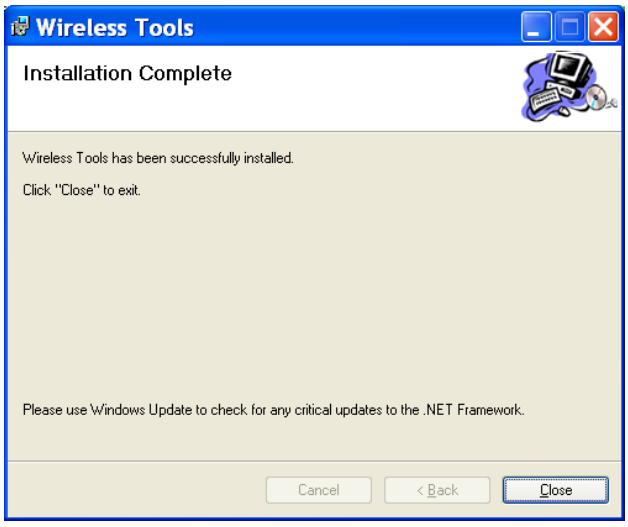
l. Click **Next** after selecting the Install directory (Default directory is recommended).


Wireless Tools
Select Installation Folder
The installer will install Wireless Tools to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files\RCS\Wireless Tools\
Browse...
Disk Cost...
Install Wireless Tools for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

m. Click **Next** to Confirm Installation.


Wireless Tools
Confirm Installation
The installer is ready to install Wireless Tools on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

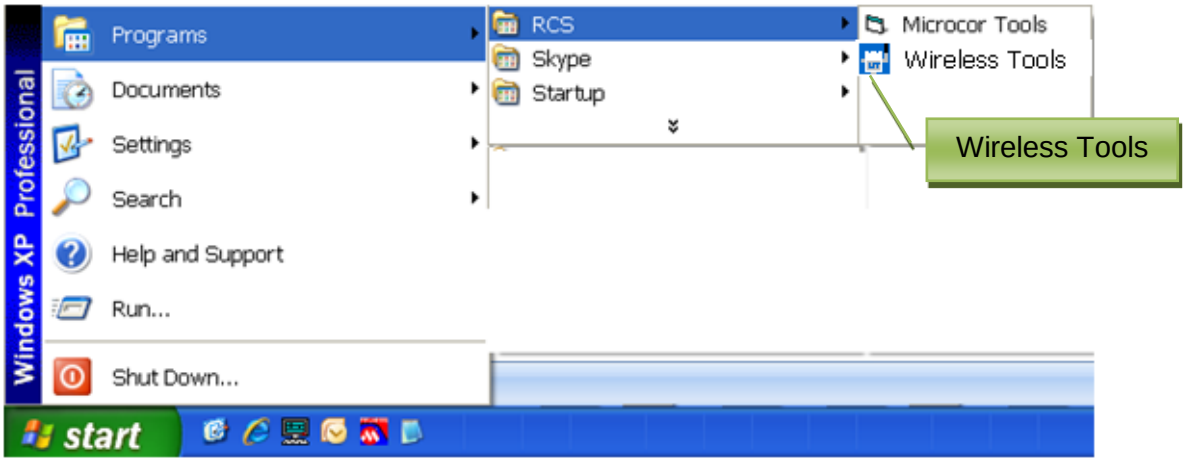
n. Click **Close** to Complete Installation.


Wireless Tools
Installation Complete
Wireless Tools has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

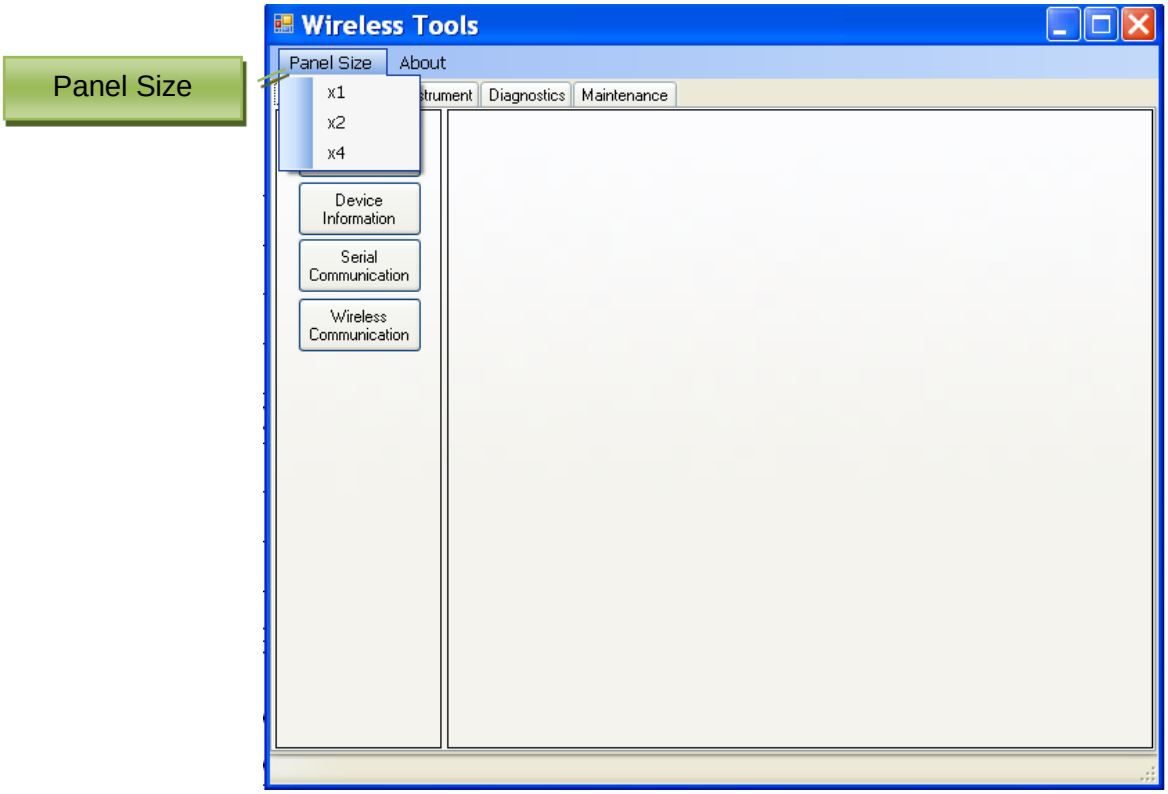
2. Run Wireless Tools

c. Click the **Wireless Tools** icon on your desktop or in the RCS folder of your Start Menu Programs list.

Or

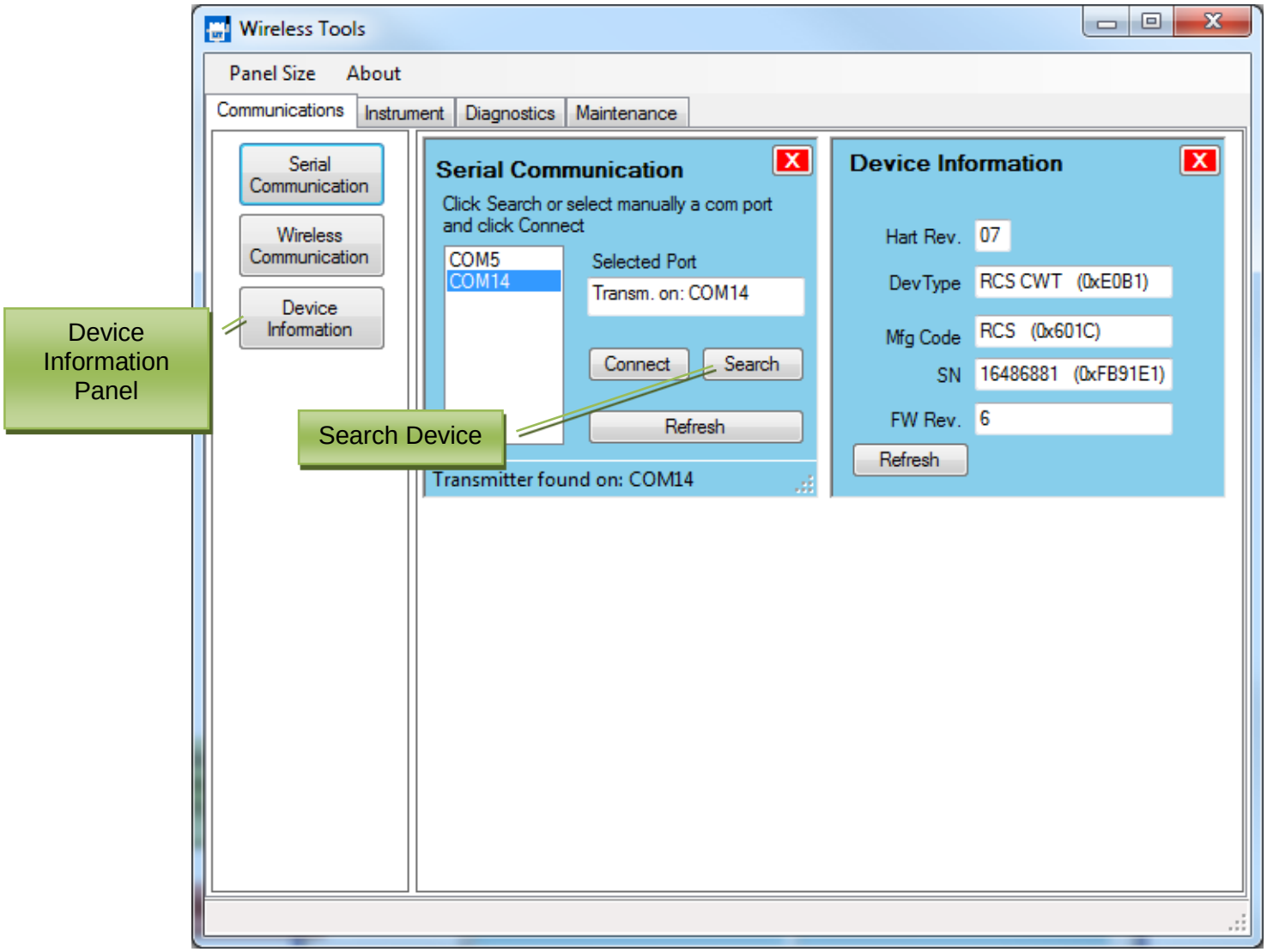


d. Click on **Panel Size** to set your display preference. This Manual will demo the x4 size.



3. Communications (Required Step)

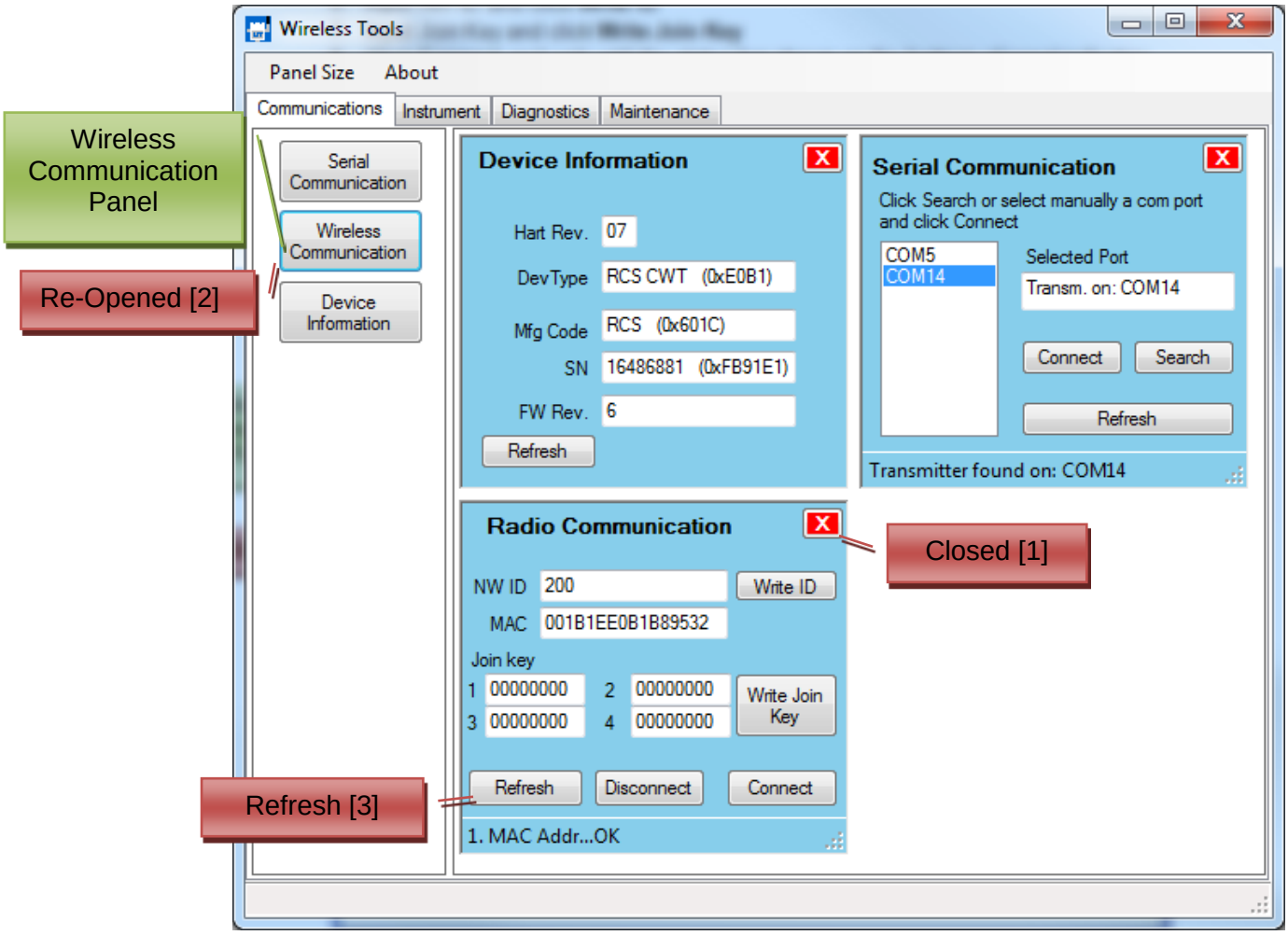
c. Click **Search Device** button to auto-detect communications port of connected MWT. The option to manually choose a com port is also available. The Device Information commands used include: The Hart Revision, Device Type of the Instrument, Manufacturer's Code, Serial Number, and the Firmware Revision of the Device. The Device Information is Read Only.



d. Click **Wireless Communication** button to configure the Network ID (NW ID) and Join Key of your connected MWT. A special sequence is required for doing this configuration:

5. Click **Disconnect** and wait until the status bar shown on the bottom of the panel indicates the end of the command.
6. Input NW ID and click **Write ID**
7. Input Join Key and click **Write Join Key**
8. Click **Connect** and wait until the status bar shown on the bottom of panel indicates that connect is OK. Click **Refresh** to verify NW ID. Join Key cannot be checked.

To verify MWT/Wireless Gateway communication: Refer to Chapter 5 Section 1 or see Chapter 6 for join verification with Gateway Interface.

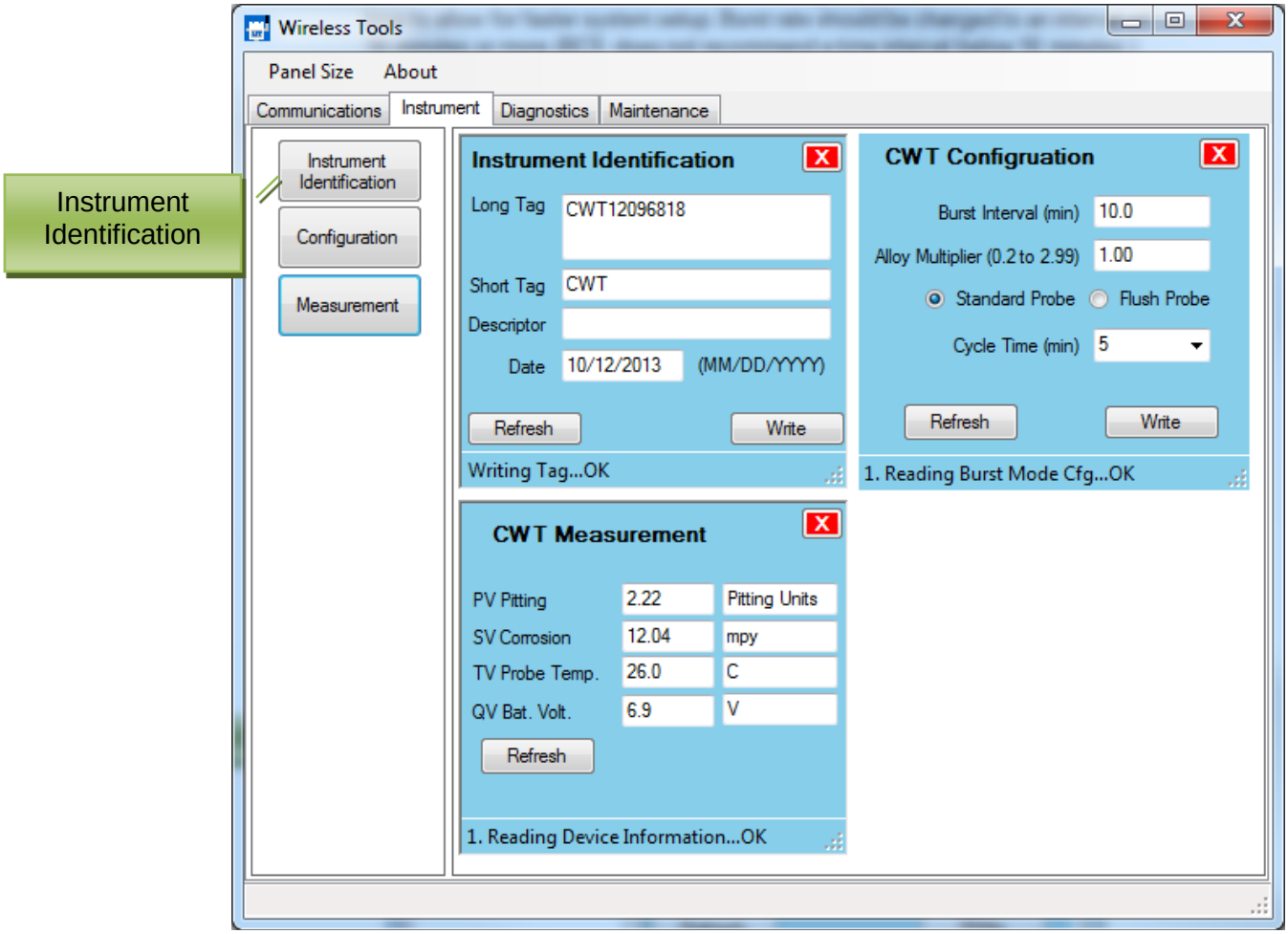


Important: If any panel is closed[1] and re-opened[2], the Refresh[3] button must be clicked to ensure the most recent information is displayed.

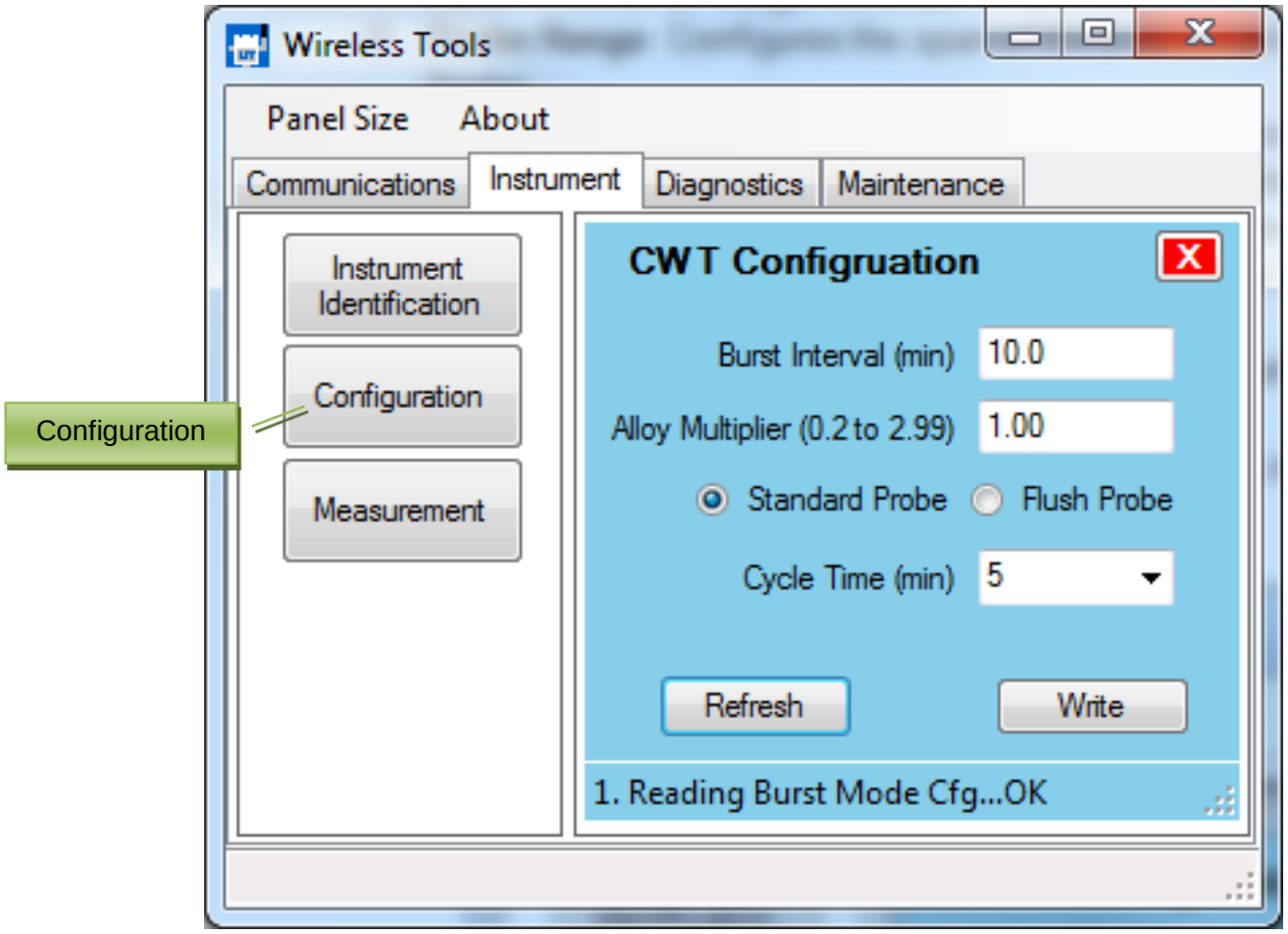
2. Instrument

d. Click **Instrument Identification** button to read and write Information to the connected MWT. The Instrument Identification commands used include: The Long Tag, Short Tag, Descriptor, and Date. The Instrument commands can be configured on the Wireless Gateway interface also. A good practice for recognizing connected devices is labeling them properly (Location, Serial Number, etc.).

5. **Long Tag**: The default value of the Long Tag is CWTxxxxxxxx, where xxxxxxxx is the Serial Number of the unit. The Long Tag can be modified to 32 characters but must be unique inside the wireless network.
6. **Short Tag**: The default value of the Short Tag is blank. The Short Tag can be modified to 8 characters.
7. **Descriptor**: The default value of the descriptor is blank. The Descriptor field can be 16 characters long and used for any type of description a user may need.
8. **Date**: Manually enter the date (mm/dd/yyyy). This field can store any date the user requires.



e. Click **Configuration** button to configure Burst Interval (Measurement Interval), Alloy Multiplier, Standard or Flush probe, and Cycle Time. The Configuration panel is read and write enabled.



1. **Burst Interval**: Configures the interval in which the CWT's transmit measurement data to the Gateway. For initial setup, the burst interval should be set to 2 minutes. A burst rate of 2 minutes will allow multiple readings to be taken in a short amount of time to allow for faster system setup. Once instrument is connected to gateway, burst rate should be changed to an interval of 10 minutes or more (RCS does not recommend a time interval below 10 minutes.) either through the Checkmate DL-W or through the Gateway Web Server. Input value must be an integer between 10 and 60 (minutes).

2. **Alloy Multiplier**: The probe alloy multiplier is a proportionality factor that relates the electrical polarization characteristics of a probe to its corrosion rate. See table below to select appropriate multiplier.

UNS Code	Material	Multiplier
K03005	Pipe Grade Carbon Steel	1.00
A91100	Aluminum 1100-0	0.94
A92024	Aluminum 2024	0.88
C11000	Copper 110 ETP Comm. Pure	2.00
C44300	CDA 443 Arsenical Admiralty	1.67
C44500	CDA 445 Phosphorized Adm.	1.68
C64200	CDA 642 A1 Silicon Bronze	1.48
C68700	CDA 687 Alum. Brass Arsenical	1.62
C70610	CDA 706 90/10 Copper/Nickel	1.80
C71500	CDA 715 70/30 Copper/Nickel	1.50
G41300	AISI 4130 Alloy Steel	1.00
L50045	Lead	2.57
N04400	Monel 400 Nickel	1.13
N05500	Monel K-500 Nickel	1.04
N06022	Hastelloy C22	0.85
N06600	Inconel 600 Nickel	0.95
N08020	Carpenter 20 CB3 SST	0.98
N08800	Incolloy 800	0.89
N08825	Incolloy 825	0.88

UNS Code	Material	Multiplier
N10276	Hastelloy C276	0.86
R50400	ASTM B-348 Grades 2-4 Titanium	0.75
S30400	AISI 304 Stainless Steel	0.89
S31600	AISI 316 Stainless Steel	0.90
S31603	AISI 316L Stainless Steel	0.90
S31803	2205 Duplex Stainless Steel	0.89
S32750	2507 Duplex Stainless Steel	0.88
Z17001	Grades 1A, 1, 2, 3, or 5 Zinc	1.29

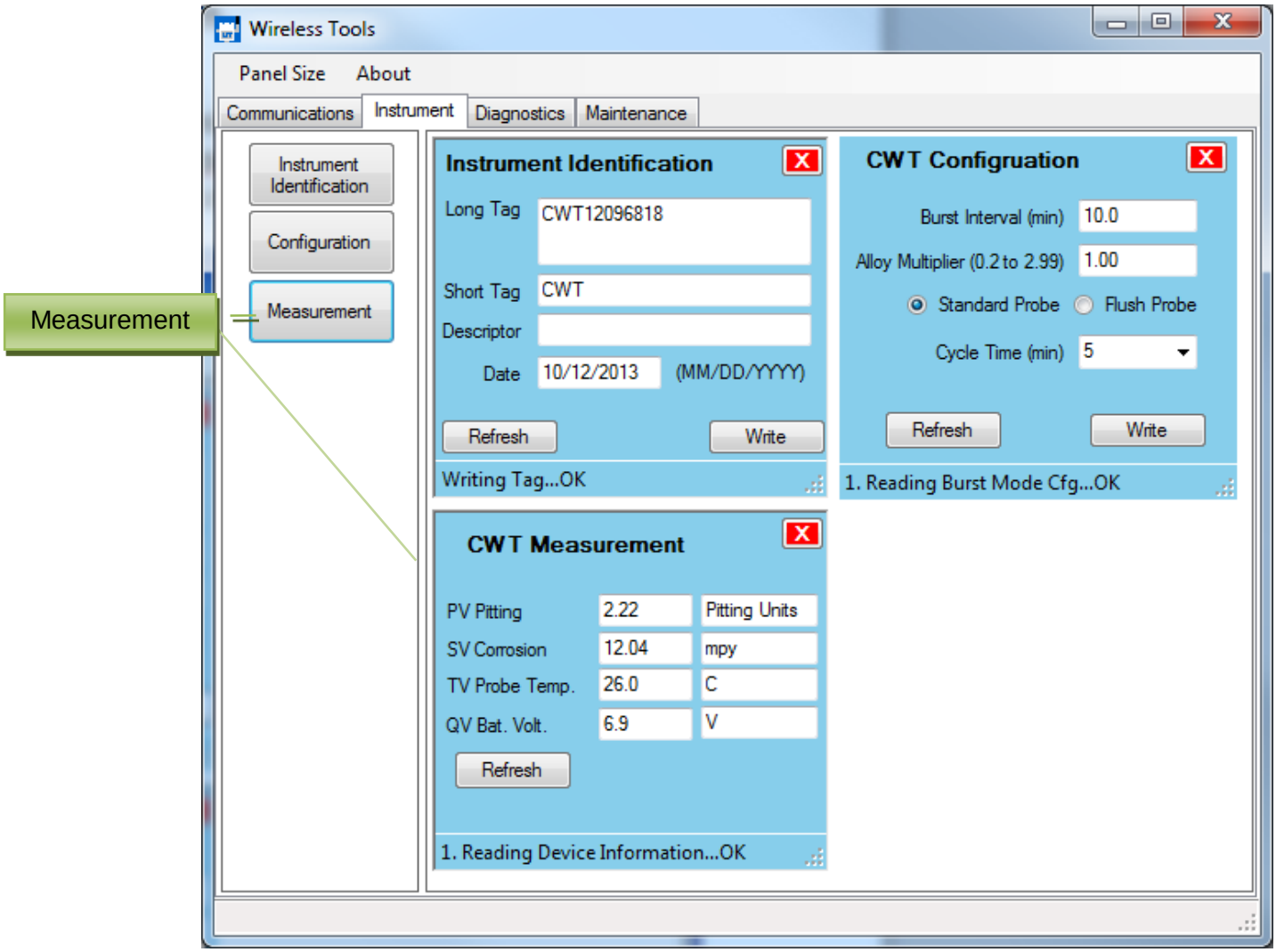
NOTE: These factors are recommended for use with the CWT-9020 when setting the MULTIPLIER value. They are based upon use of Corrater electrodes which have surface areas of 5cm² for ”standard” probes and 0.5cm² for “flush” probes.

3. **Cycle Time**: 5, 10, 15, or 20 minutes selectable.

f. Click **Measurement** button to read all dynamic variables. The variables used include Primary, Secondary, Tertiary, and Quaternary. The variables are read only.

Note: Valid readings will appear after 1 measurement cycle is complete. Temperature may not read if probe does not support temperature.

5. **PV (Primary Variable)**: Pitting in Pitting Units.
6. **SV (Secondary Variable)**: Corrosion Rate in mils per year.
7. **TV (Tertiary Variable)**: Probe Temperature in deg C (functional for certain probes).
8. **QV (Quaternary Variable)**: Battery Voltage in Volts.



Installation of the CWT

The CWT-9020 is intended to be used with any standard 2-electrode CORRATER® probes. Three electrode probes can also be used, but for simplicity and economy, it is recommended that 2-electrode probes be used. Probes with replaceable cylindrical electrodes are generally referred to as "standard" probes, and probes with disc electrodes are referred to as "flush" probes because the electrodes are flush with the end surface of the probe. The probes are available in many designs including fixed, adjustable, retractable and retrievable mounting configurations.
Also, probe electrodes are available in many element and alloy materials. The material selected should closely match the material of construction of the pipe or vessel for which corrosion information is desired.

Probes should be installed where corrosion is most likely to be greatest so that readings will truly represent the most aggressive system corrosion rates. Preferably, they should be located where the liquid flow velocity past the electrode exceeds 1 foot per second (0.3 m/sec.) if it is required to measure corrosion rates representative of a flowing environment. Alignment of the electrodes relative to the direction of process flow is important to obtain reliable corrosion rate measurements. Proper alignment is with the imaginary line connecting the center lines of the two electrodes perpendicular to the direction of the process flow. Refer to Figure 1. With this orientation, one electrode does not "shade" the other electrode, and both are subject to nearly the same corrosive environment. If a probe is installed in an elbow fitting, where flow changes direction, position the probe so that the electrodes "face" the oncoming flow. Refer to Figure 2.

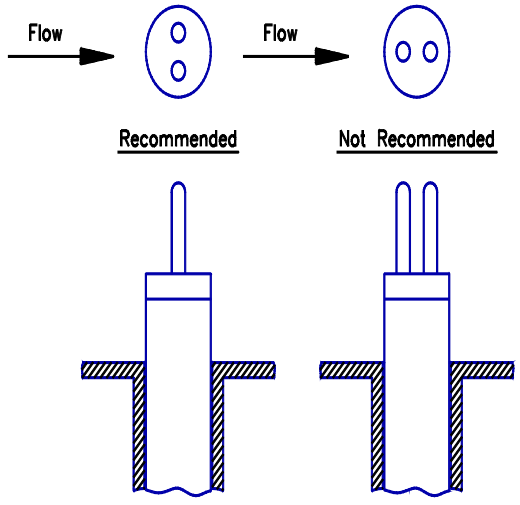


Figure 1 **Probe Orientation Relative to Flow**

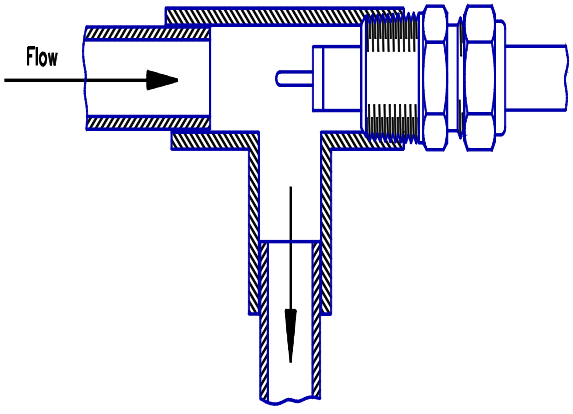


Figure 2 **Probe Orientation at a Tee Fitting**

Chapter 6
MWT-WE (Cosasco® Wireless Extender)

Introduction

The Cosasco Wireless Extender MWT-3905-WE is used to expand the network when Cosasco Wireless Devices are located distances that are out of the wireless range direct to the gateway. The Wireless Extender is identical to the MWT, with the exception of the electronics measuring corrosion. The Wireless Extender integrates seamlessly with other Cosasco Wireless Devices and Emerson Wireless devices using WirelessHART 7 protocol. The Wireless Extender can be setup and configured using RCS's Wireless Tools Software or the convenient Checkmate DL-W Wireless Configurator for Zone 1, hazardous areas.

The setup and installation of the Wireless Extender is similar to the MWT. The following will take you through the necessary steps to easily setup and install Wireless Extenders.

1. If you have not done so already for existing or new Cosasco Wireless Devices, you will need to pre-configure the Gateway. Please refer to Chapter 3, Gateway pre-configuration.

2. Once you have pre-configured the Gateway you will now need to program the Wireless Extenders.

Programming the Wireless Extender with Wireless Tools PC Software

Preset Check List

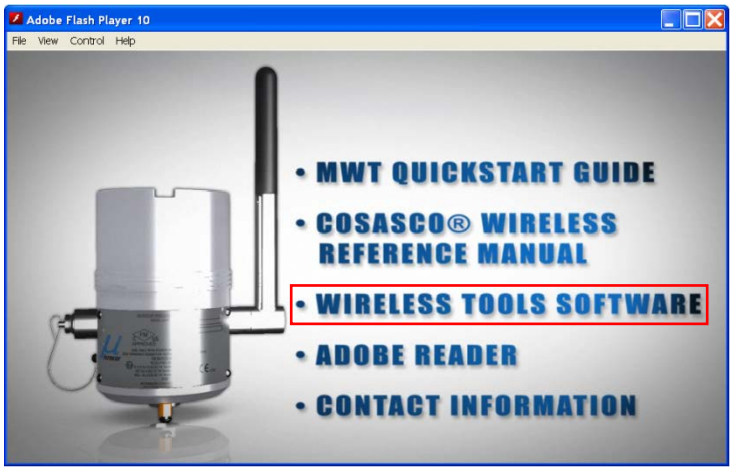
- ✓ Be sure the power module is installed in the Wireless Extender prior to start of programming.
- ✓ Connect the communication cable (748110-9A) to both the computer and the MWT.
- ✓ If using USB to RS232 adapter, be sure to install supplied drivers by the manufacturer.
- ✓ Install Wireless Tools Software.

*****Important: To preserve battery life, please ensure that the power module is removed from the Wireless Extender if it is not in use or connected to a network.*****

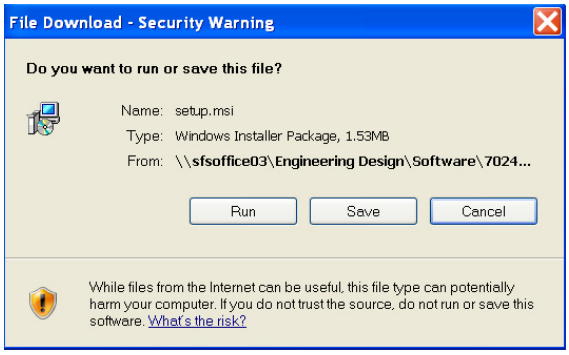
1. Install Wireless Tools Software

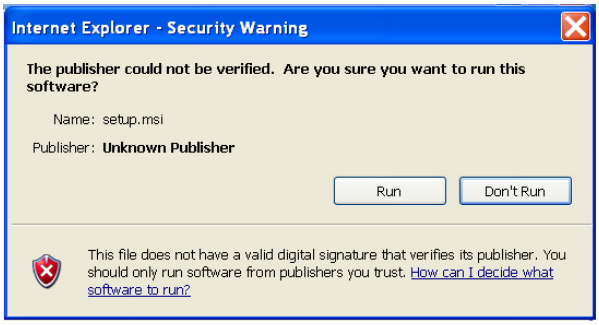
a. Insert the Setup and Installation CD that was included with the MWT Installation Kit.

b. Click **Install** Wireless Tools Software

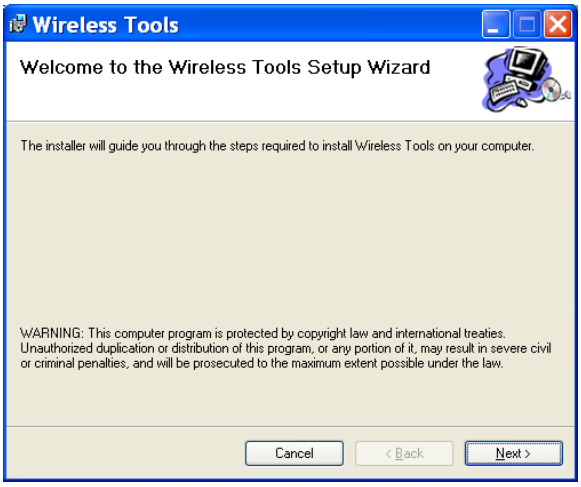


c. A security warning window may appear. If so, click **Run**. Another Security warning window will appear. Click **Run** again.

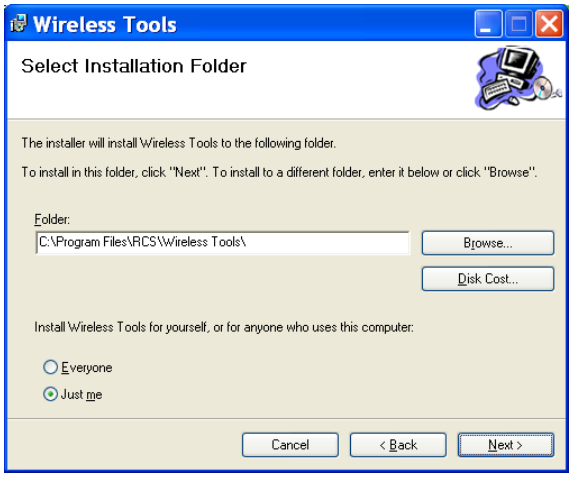

File Download - Security Warning
Do you want to run or save this file?
Name: setup.msi
Type: Windows Installer Package, 1.53MB
From: \\sfsoffice03\Engineering Design\Software\7024...
Run
Save
Cancel
While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?


Internet Explorer - Security Warning
The publisher could not be verified. Are you sure you want to run this software?
Name: setup.msi
Publisher: Unknown Publisher
Run
Don't Run
This file does not have a valid digital signature that verifies its publisher. You should only run software from publishers you trust. How can I decide what software to run?

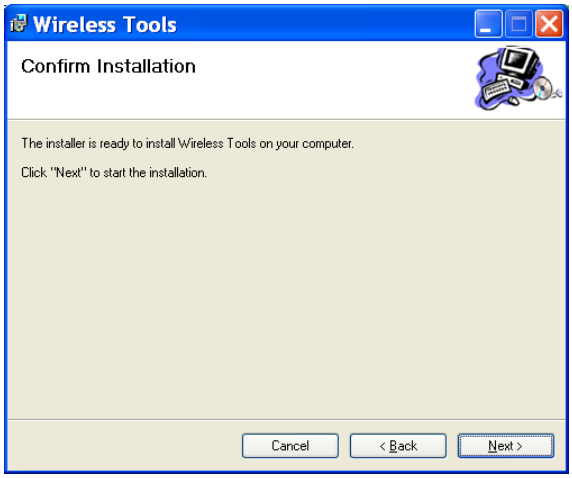
d. The Wireless Tools Setup Wizard window will appear. Click **Next** to begin installation.


Wireless Tools
Welcome to the Wireless Tools Setup Wizard
The installer will guide you through the steps required to install Wireless Tools on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

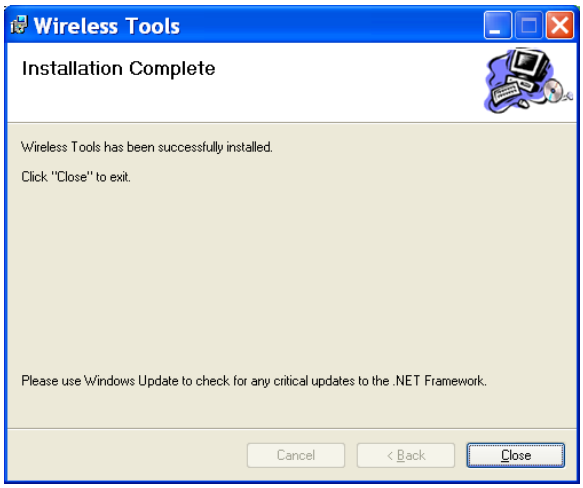
e. Click **Next** after selecting the Install directory (Default directory is recommended).


Wireless Tools
Select Installation Folder
The installer will install Wireless Tools to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files\RCS\Wireless Tools\
Browse...
Disk Cost...
Install Wireless Tools for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

f. Click **Next** to Confirm Installation.


Wireless Tools
Confirm Installation
The installer is ready to install Wireless Tools on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

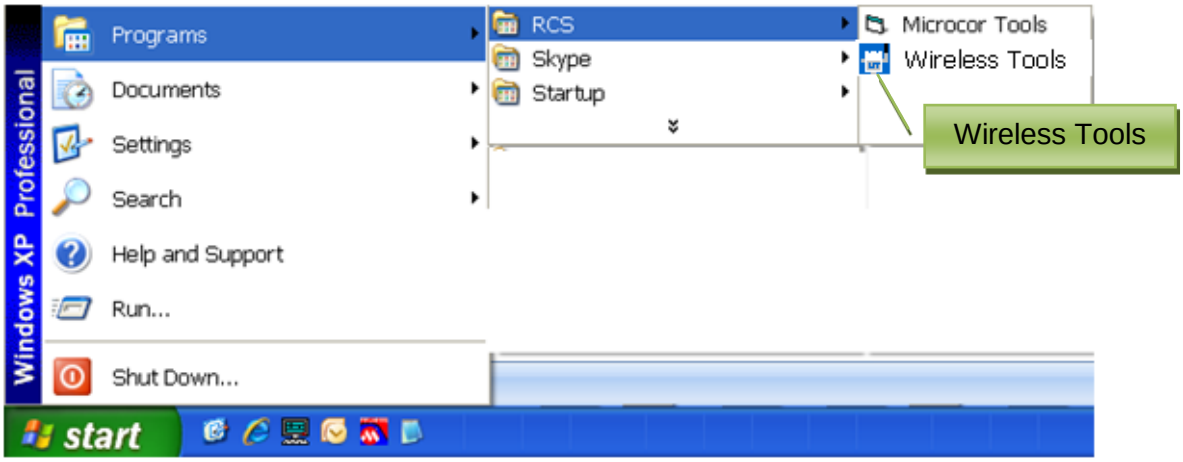
g. Click **Close** to Complete Installation.


Wireless Tools
Installation Complete
Wireless Tools has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

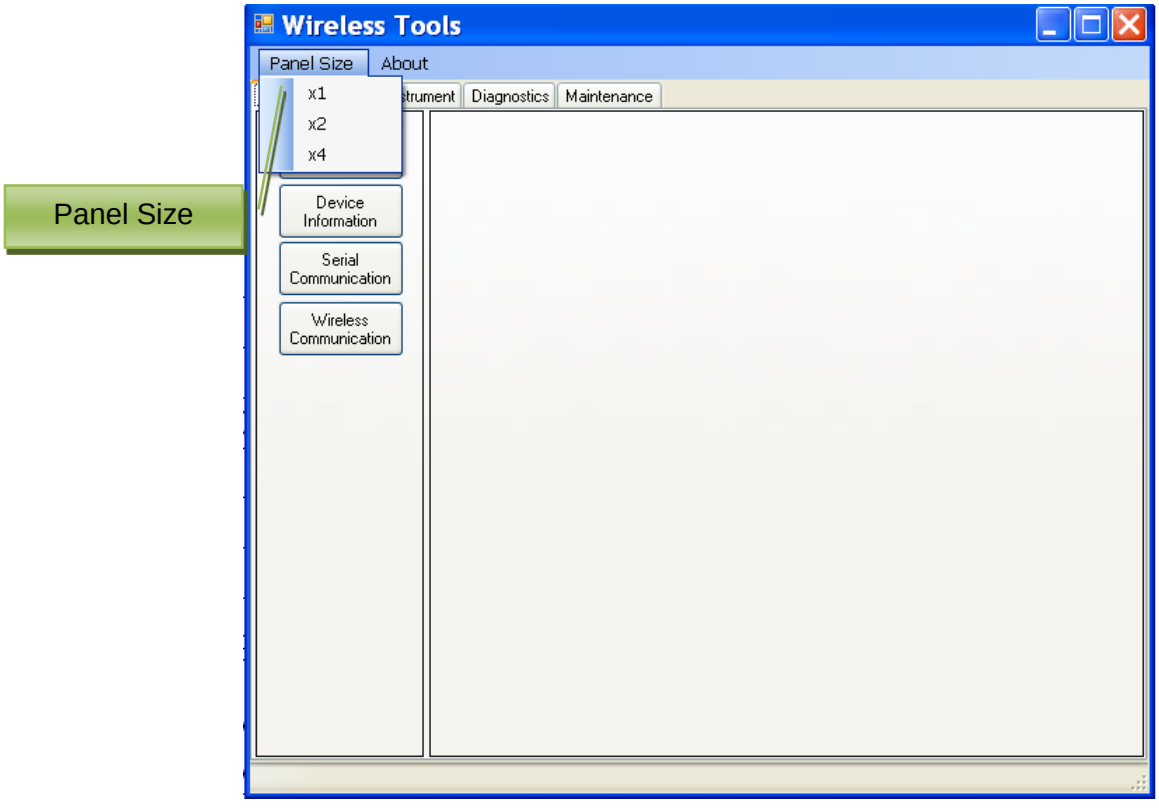
2. Run Wireless Tools

a. Click the **Wireless Tools** icon on your desktop or in the RCS folder of your Start Menu Programs list.

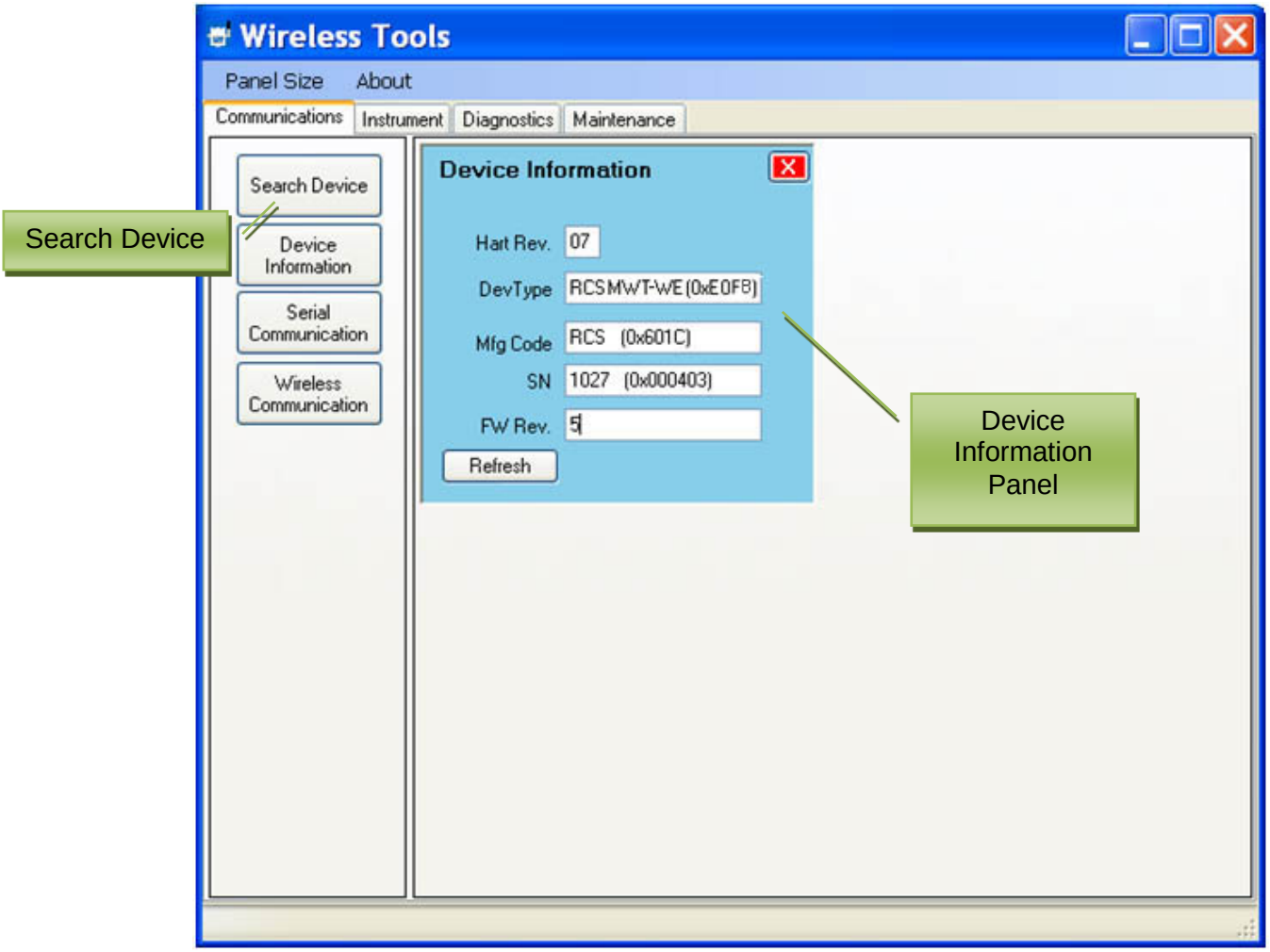
Or



b. Click on **Panel Size** to set your display preference. This Manual will demo the x4 size.



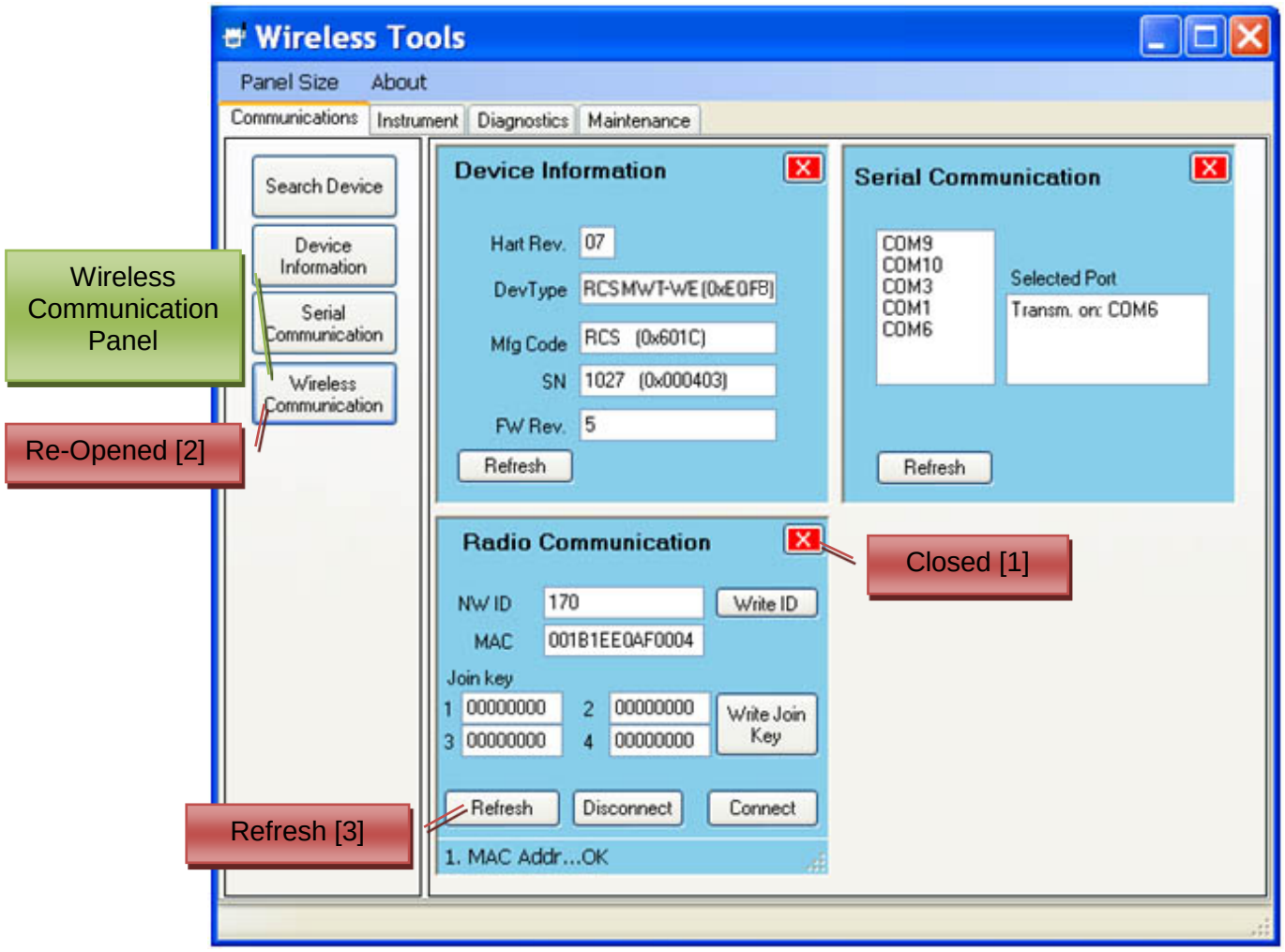
3. **Communications (Required Step)**
   a. Click **Search Device** button to auto-detect communications port of connected Wireless Extender. The Device Information commands used include: The Hart Revision, Device Type of the Instrument, Manufacturer's Code, Serial Number, and the Firmware Revision of the Device. The Device Information is Read Only.



b. Click **Wireless Communication** button to configure the Network ID (NW ID) and Join Key of your connected Wireless Extender. A special sequence is required for doing this configuration:

1) Click **Disconnect** and wait until the status bar shown on the bottom of the panel indicates the end of the command.
2) Input NW ID and click **Write ID**
3) Input Join Key and click **Write Join Key**
4) Click **Connect** and wait until the status bar shown on the bottom of panel indicates that connect is OK. Click **Refresh** to verify NW ID. Join Key cannot be checked.

Wireless Extender/Wireless Gateway communication: Refer to Chapter 5 Section 1 or see Chapter 6 for join verification with Gateway Interface.

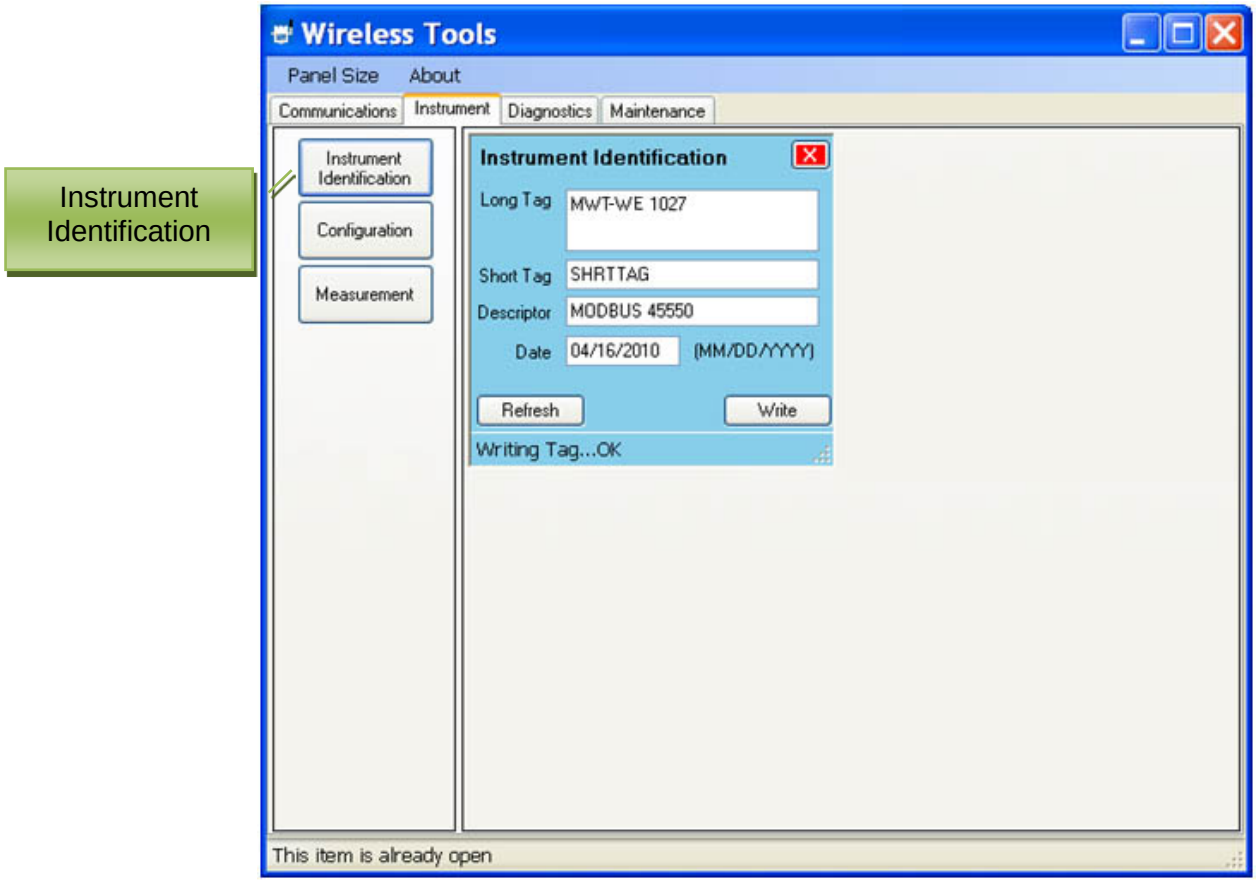


Important: If any panel is closed[1] and re-opened[2], the Refresh[3] button must be clicked to ensure the most recent information is displayed.

4. Instrument

a. Click **Instrument Identification** button to read and write Information to the connected Wireless Extender. The Instrument Identification commands used include: The Long Tag, Short Tag, Descriptor, and Date. The Instrument commands can be configured on the Wireless Gateway interface also. A good practice for recognizing connected devices is labeling them properly (Location, Serial Number, etc.).

1) **Long Tag**: The default value of the Long Tag is MWTxxxx, where xxxx is the Serial Number of the unit. The Long Tag can be modified to 32 characters but must be unique inside the wireless network.
2) **Short Tag**: The default value of the Short Tag is blank. The Short Tag can be modified to 8 characters.
3) **Descriptor**: The default value of the descriptor is blank. The Descriptor field can be 16 characters long and used for any type of description a user may need.
4) **Date**: Manually enter the date (mm/dd/yyyy). This field can store any date the user requires.



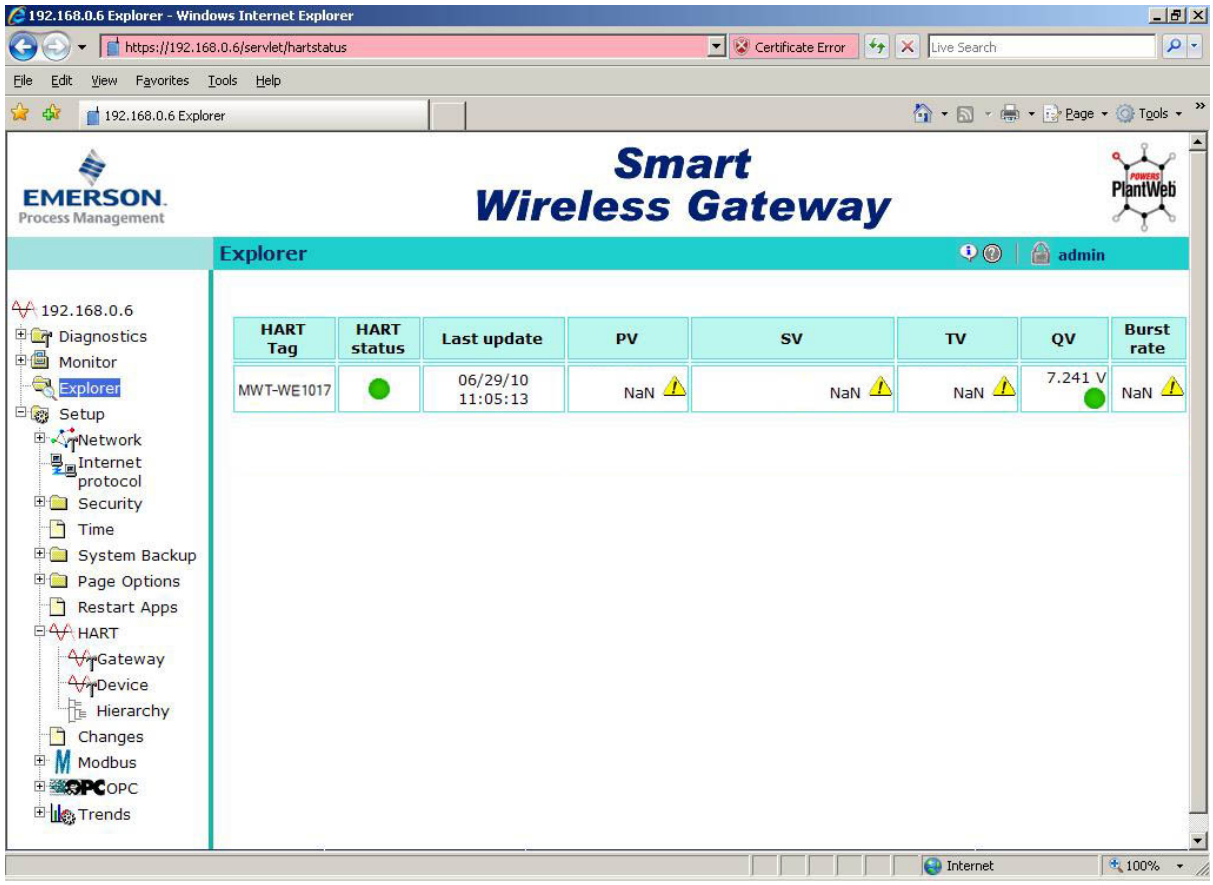
b. Please refer to section b1 of Chapter 4 to configure initial burst rate (Page 22).

c. Configuration of the Wireless Extender is now complete and should be joined to the Gateway and other Wireless devices in the network.

Join Verification with Wireless Gateway

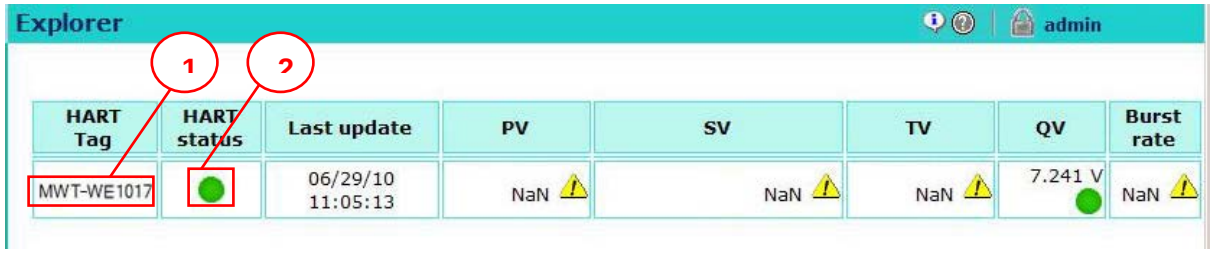
Once you have programmed all the Wireless Extenders that you will be joining to the network, you will want to verify that they are joined to the Gateway.

1. **Join Verification with 1420 Wireless Gateway**
   a. With the Wireless Gateway on and ready, open the Gateway web server page via your web browser. Click on **Explorer** from the left hand menu tree and wait for Wireless Extenders that you programmed to join with green status.



   b. Once in the Explorer area you will need to locate the HART Tag (item number 1.) for the transmitter(s) you are connecting.

Note: This may take several minutes for the Wireless Extender to connect for the first time.



c. Once you have located the HART Tag you will need to wait for the HART Status (item number 2) to turn green. Since the Wireless Extender does not have any data associated with it the PV, SV, and TV variables as well as the Burst Rate will show as null values. The QV (Quaternary Variable) is battery voltage in volts.

Diagnostics

For diagnostics, refer to Chapter 7, Sections 1a, 1b, 1c, and 1e only.

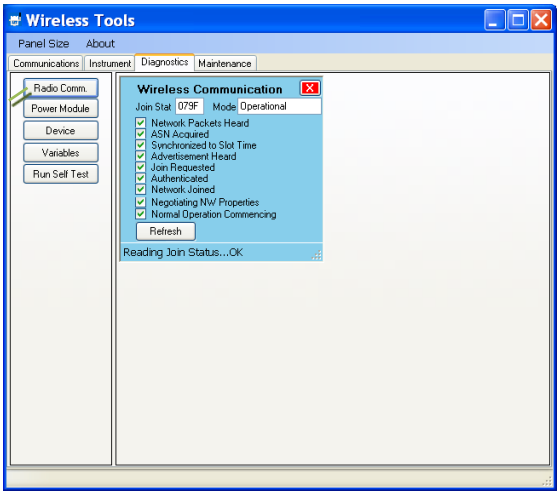
Chapter 7
Diagnostics

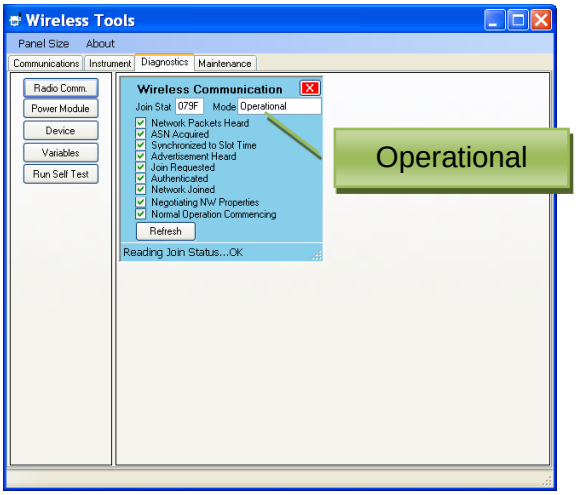
1. Diagnostics (Optional)

a. Click **Radio Communication** button to read the join status between the MWT and the Gateway. The initial condition (disconnected) of the status code is “0000” Hex. The completed Join process is indicated by “079F” Hex code. The mode will also confirm device connection by changing status from “Active Search” to “Operational.” Please allow 5 minutes for the MWT to join the Gateway.

See Chapter 6 to view Gateway interface verification of successful join.

Radio Communication



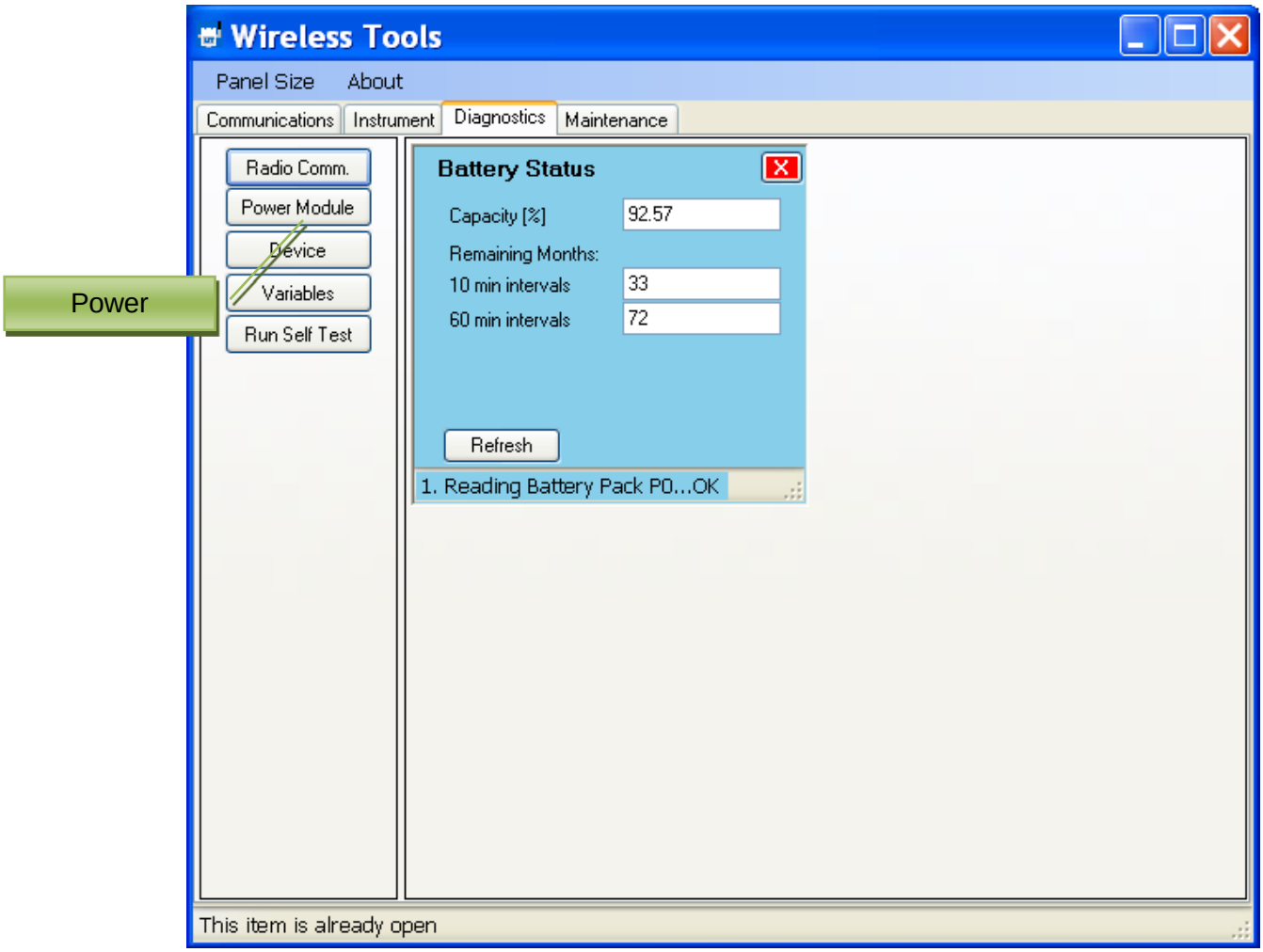


Operational

Important: To update the Radio Communication panel, click the Refresh button to ensure the most recent information is displayed

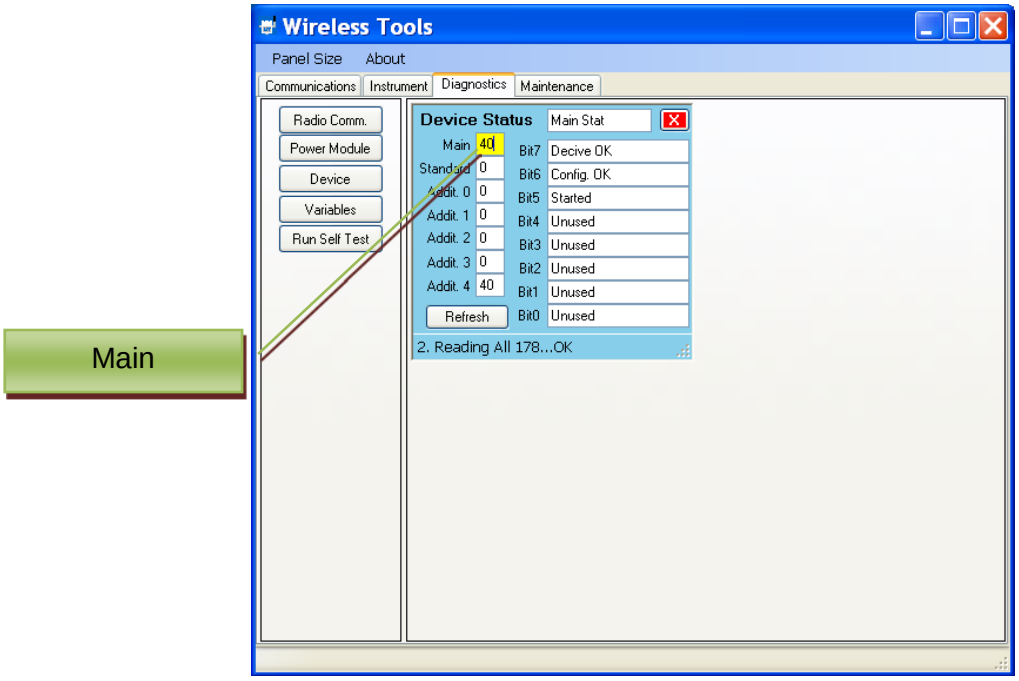
b. Click **Power Module** button to read battery power information.

1. **Capacity [%]**: This is a calculated estimate of remaining power.
2. **Remaining months at 10 Min**. **Intervals:**
   This is a calculated estimate of remaining power with the use of 10 min burst/measurement intervals.
3. **Remaining months at 60 Min. Intervals:**
   This is a calculated estimate of remaining power with the use of 60 min burst/measurement intervals.

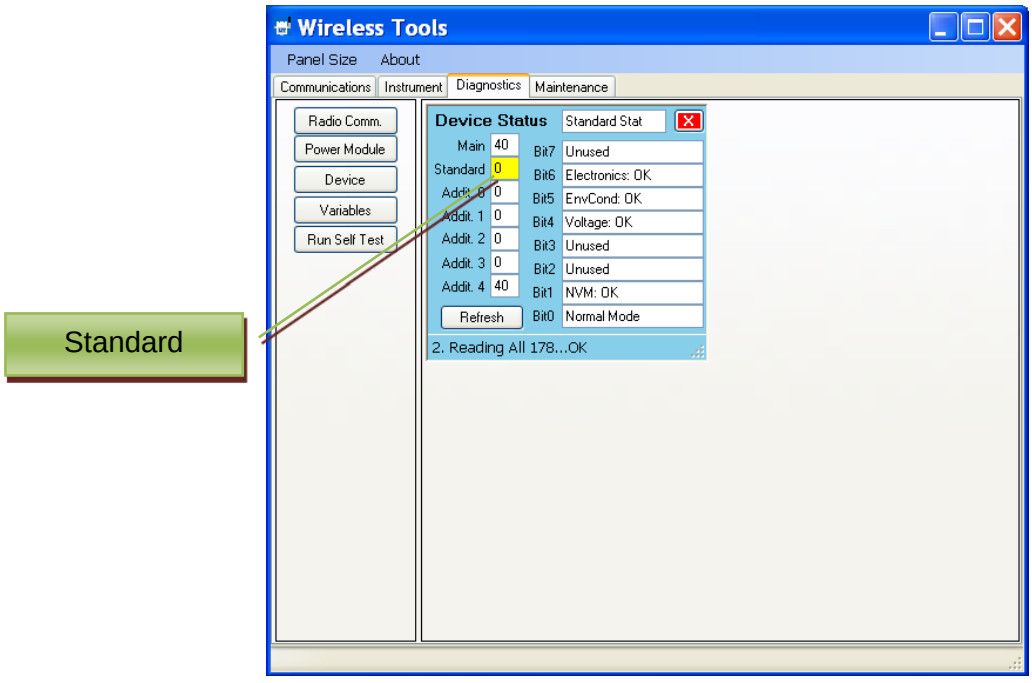


c. Click **Device** button to read Device Status Information. To check proper functionality of the device, you must click on each byte to view individual bit information.

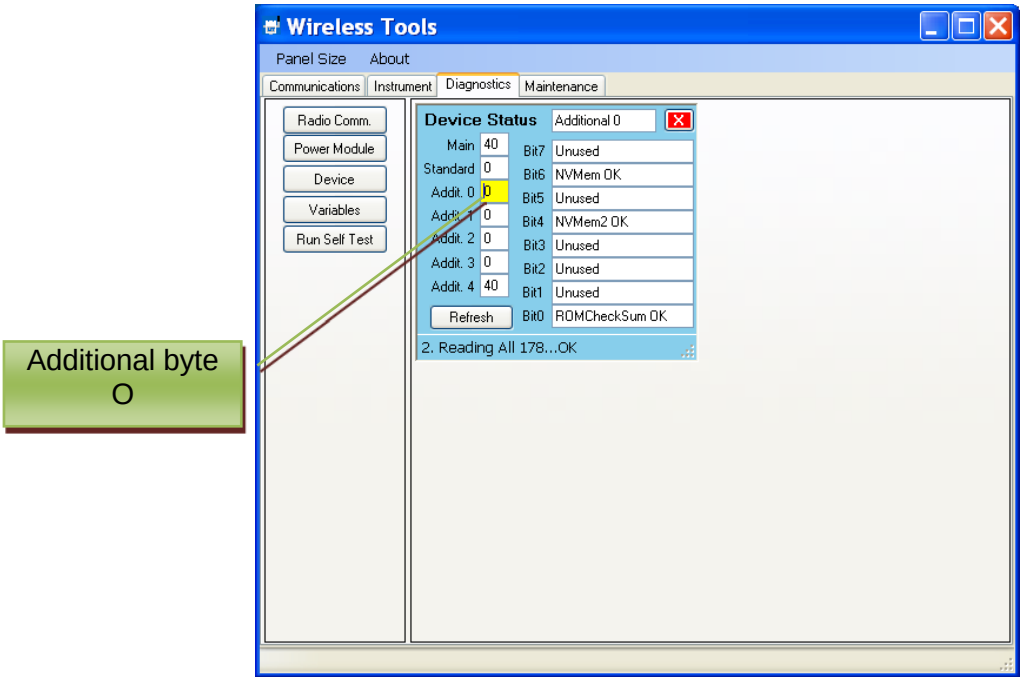
1. **Main:** Bit 7: Device OK, Bit 6: Config. OK. Bit 0-5: Unused



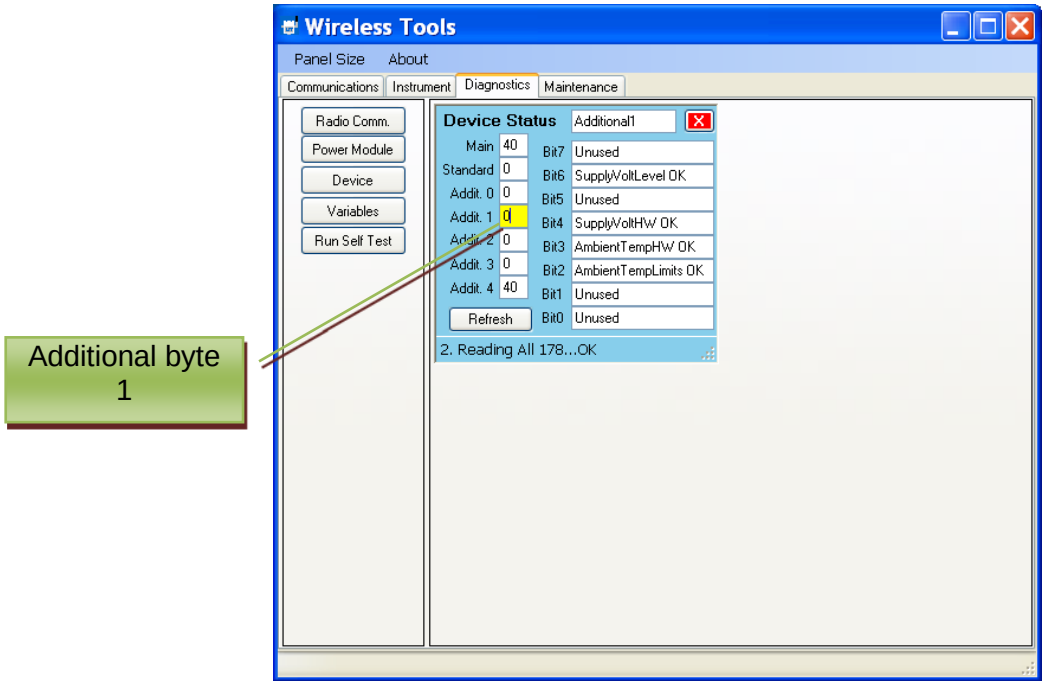
2. **Standard**: Bit 6: Electronics OK, Bit 5: Environmental Condition OK, Bit 4: Voltage OK, Bit 1: NVM OK, Bit 0: Normal Mode. Bits 7,3, and 2 are Unused.



3. **Additional byte 0**: Bit 6: NVMem OK, Bit 4: NVMem2 OK, Bit 0: ROM CheckSum OK, Bits 7, 5, 3, 2, and 1 are unused.

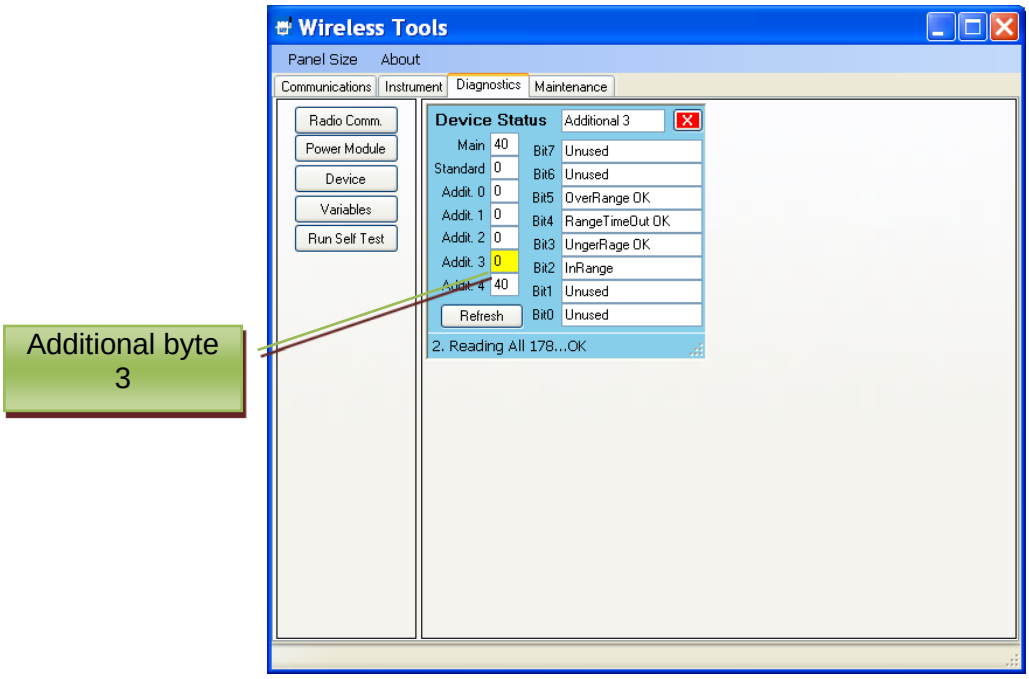


4. **Additional byte 1**: Bit 6: Supply Voltage Level OK, Bit 4: Supply Voltage Hardware OK, Bit 3: Ambient Temperature Hardware OK, Bit 2: Ambient Temperature Limits OK, Bits 7, 5, 1, 0 are unused.

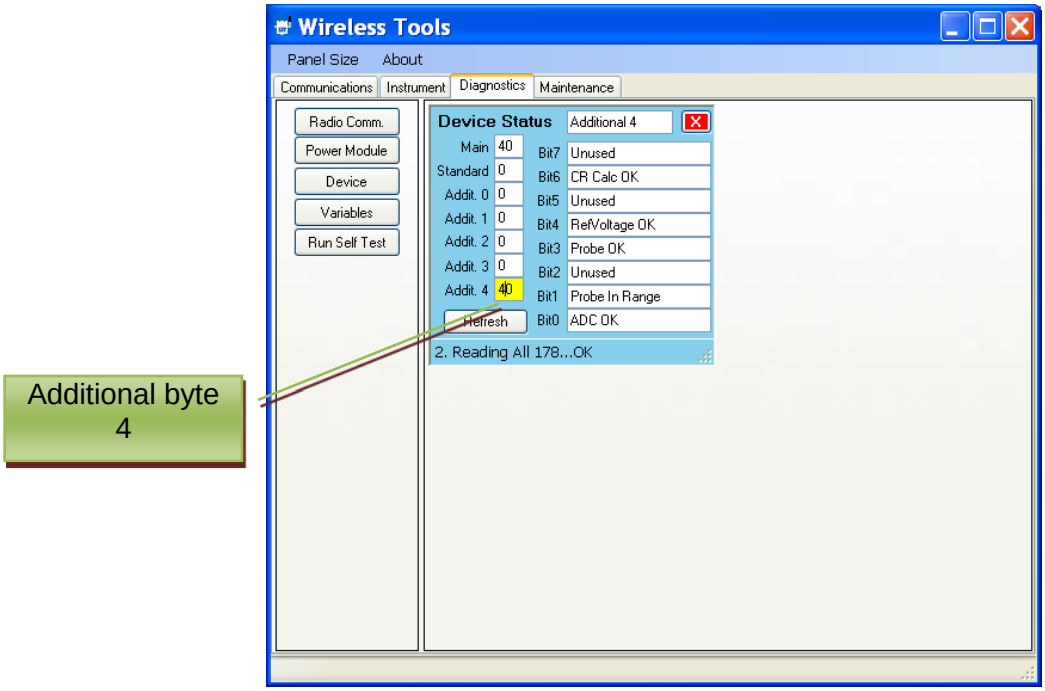


5. **Additional byte 2: Bits 7-0 are unused.**
6. **Additional byte 3: Bit 5: Over Range OK, Bit 4: Range Time Out OK, Bit 3: Under Range OK, Bit 2: In Range, Bits 7, 6, 1, and 0 are unused.**

Note: These bits are related to fault probe detection. If values don't match for Additional byte 3 or 4, likely there is a probe problem. Troubleshoot MWT with a test probe.



7. **Additional byte 4:** Bit 6: Corrosion Rate Calculation OK, Bit 4: Reference Voltage OK, Bit 3: Probe OK,Bit 1: Probe In Range, Bit 0: Bit 0: ADC OK. Bits 7, 5, and 2 are unused.



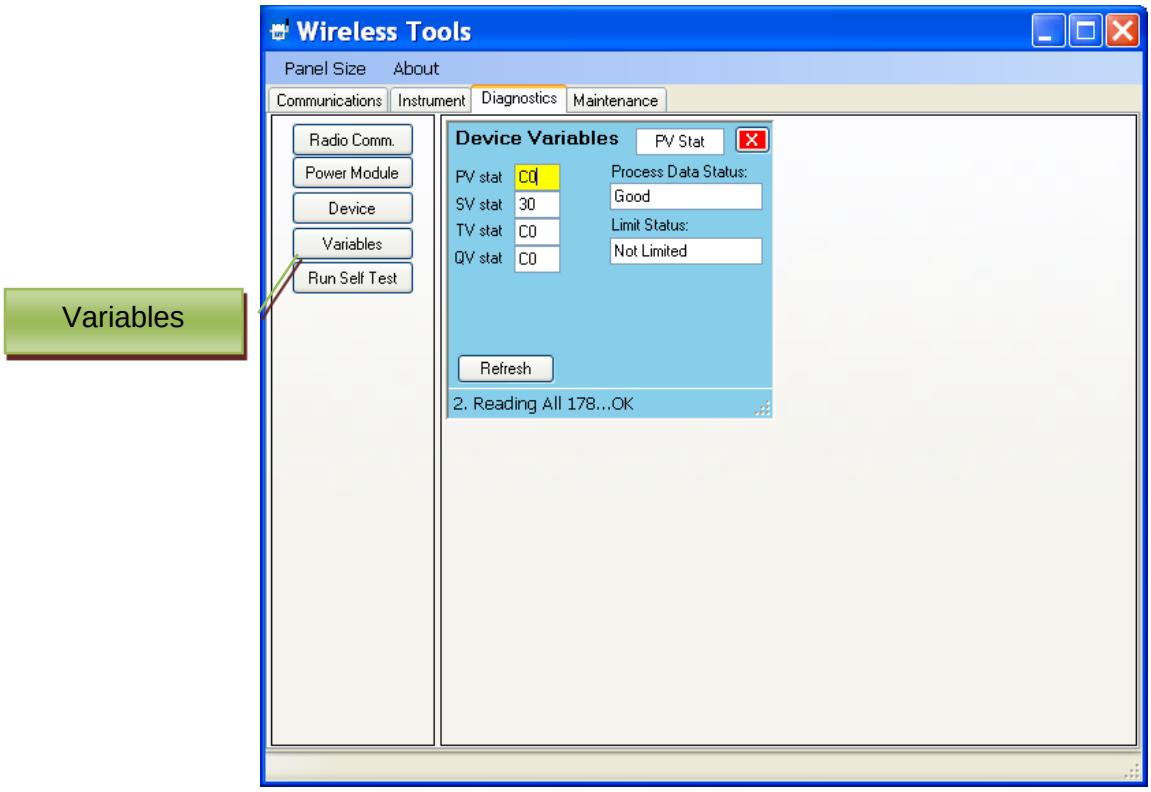
d. Click **Variables** button to read Device Variable Information. The following are standardized HART commands. Process data should be "Good" and Limit Status should be "Not Limited."

1. **Primary Variable Status:**
   Process Data Status: Good or Bad.
   Limit Status: Constant or Not Limited.

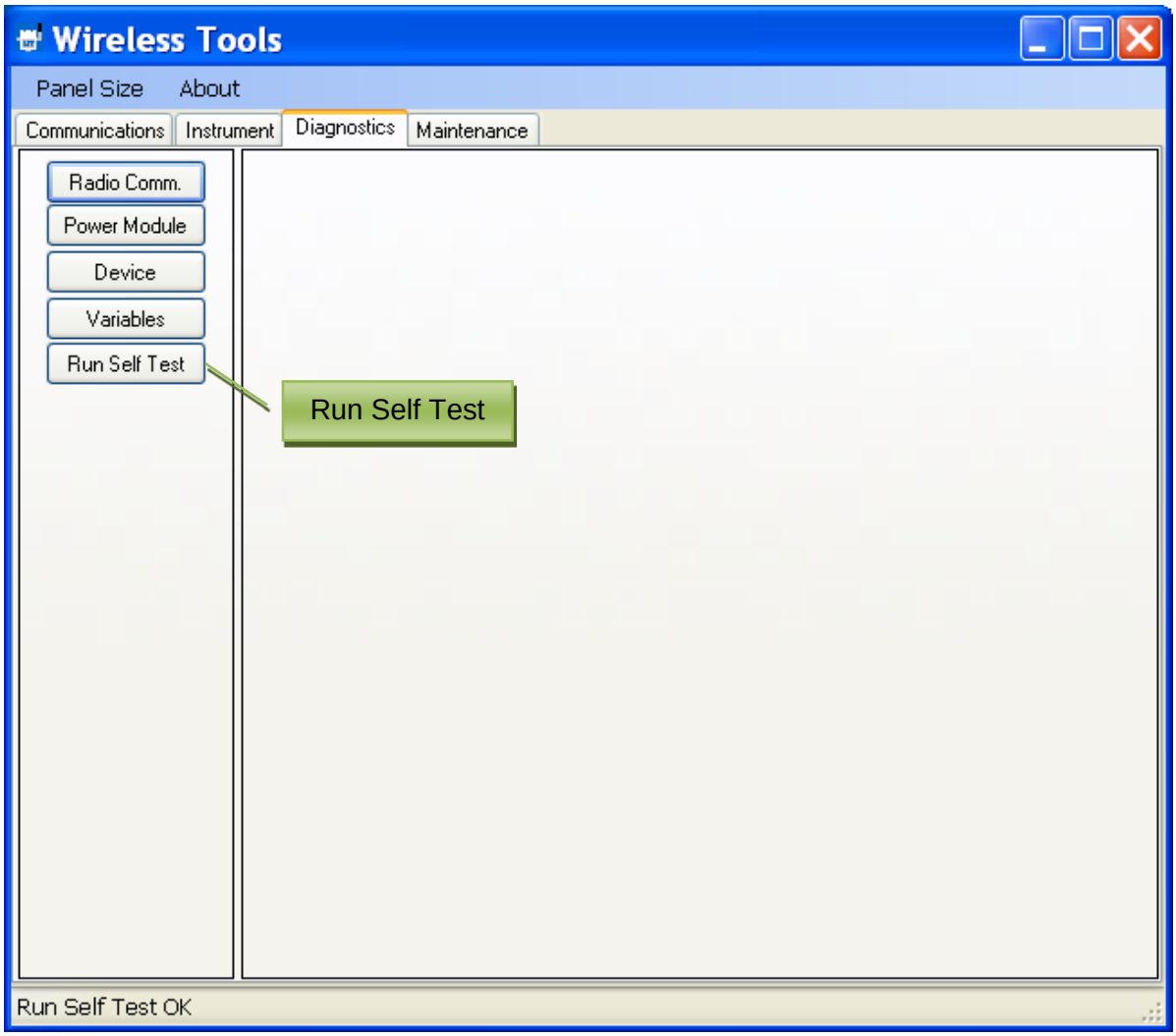
2. **Secondary Variable:**
   Process Data Status: Good or Bad.
   Limit Status: Constant or Not Limited.

3. **Tertiary Variable:**
   Process Data Status: Good or Bad.
   Limit Status: Constant or Not Limited.

4. **Quaternary Variable:**
   Process Data Status: Good or Bad.
   Limit Status: Constant or Not Limited.

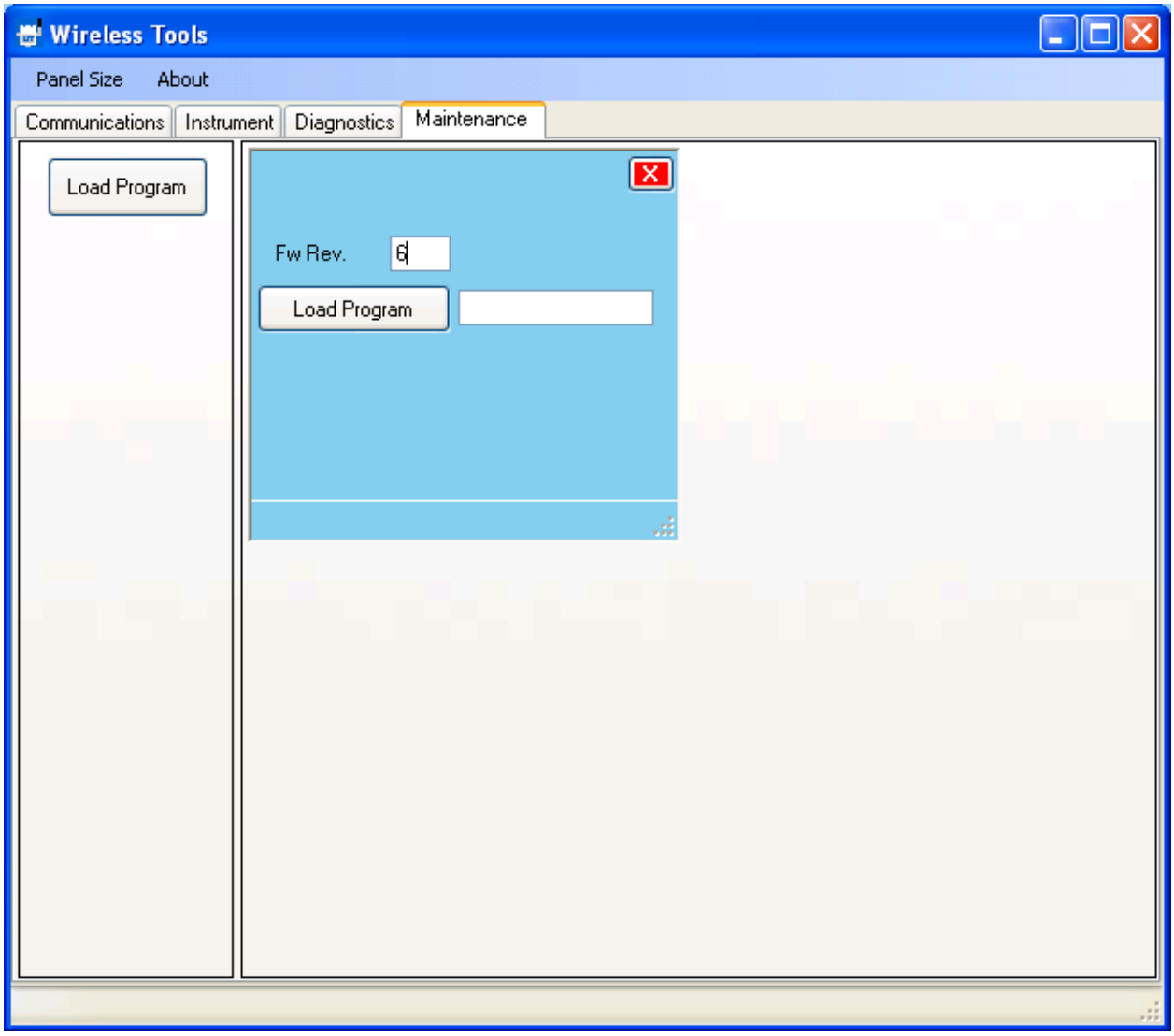


e. Click **Run Self Test** button to test EPROM, Battery Voltage, and Instrument Temperature Tests.



2. Maintenance (Firmware Updates)

a. Click **Load Program** once a new Firmware version has been assigned. The current firmware revision should be checked with RCS Customer Service before updating for your respective instrument (CWT/MWT/MWT-QS/WE).

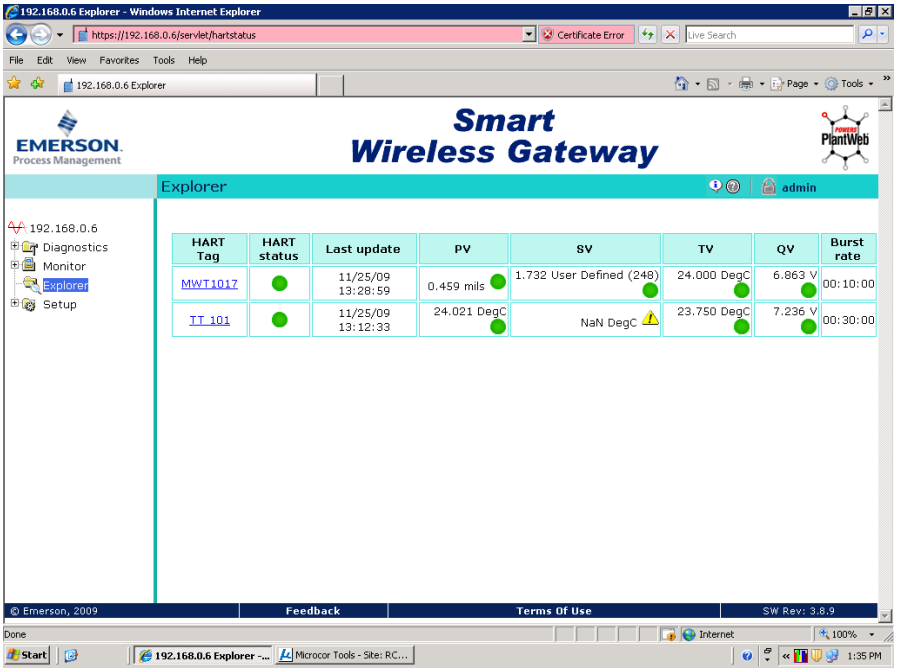


Chapter 8
Join Verification with Wireless Gateway

Once you have programmed all the MWT's that you will be joining to the network, you will want to verify that they are joined to the Gateway.

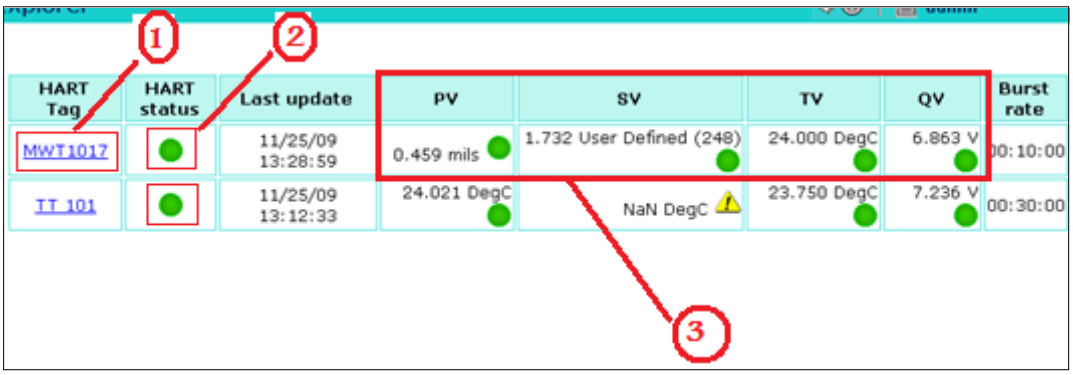
1. Join Verification with 1420 Wireless Gateway

With the Wireless Gateway on and ready, open the Gateway web server page via your web browser. Click on **Explorer** from the left hand menu tree and wait for device(s) programmed in chapter 4 to join with green status.



a. Once in the **Explorer** area you will need to locate the **HART Tag** (item number 1.) for the transmitter(s) you are connecting.

Note: This may take several minutes for the MWT to connect for the first time.

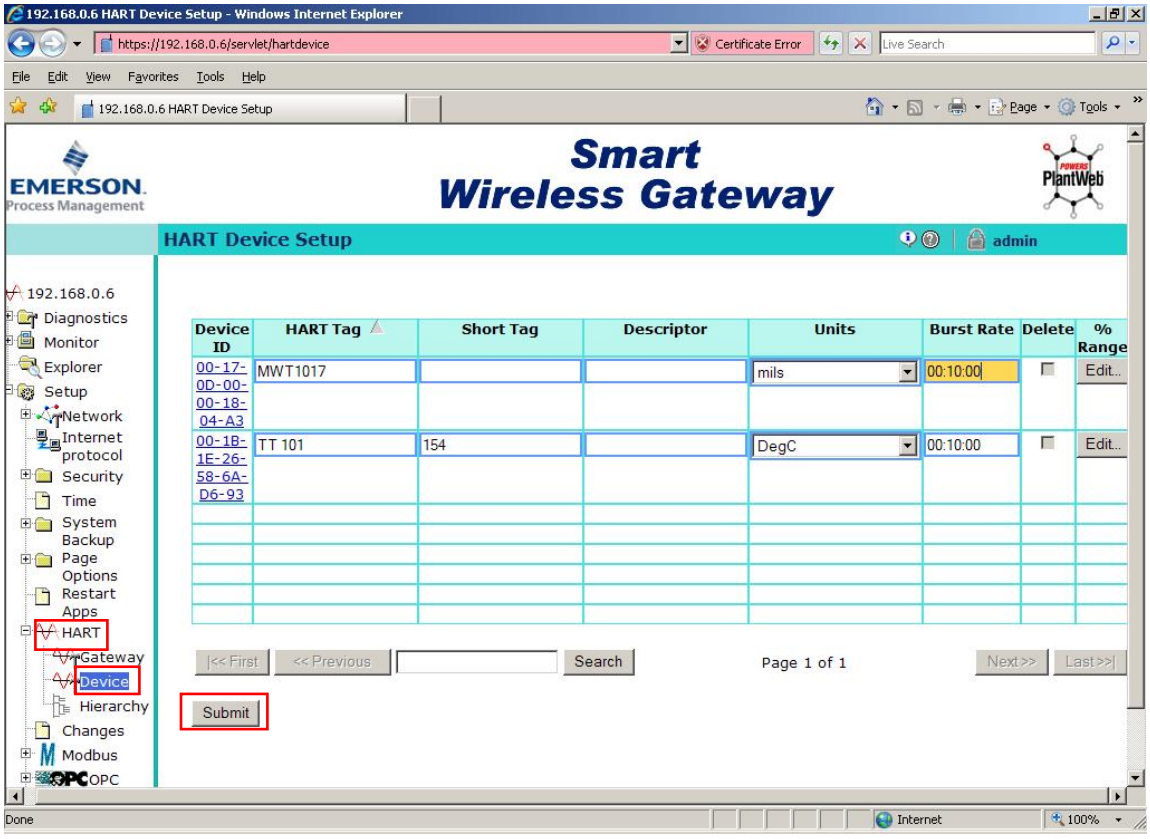


b. Once you have located the **HART Tag** you will need to wait for the **HART Status** (item number 2) to turn green. Once the status goes green you will start receiving data for the PV, TV, and QV sections. The different variables sections are as follows:

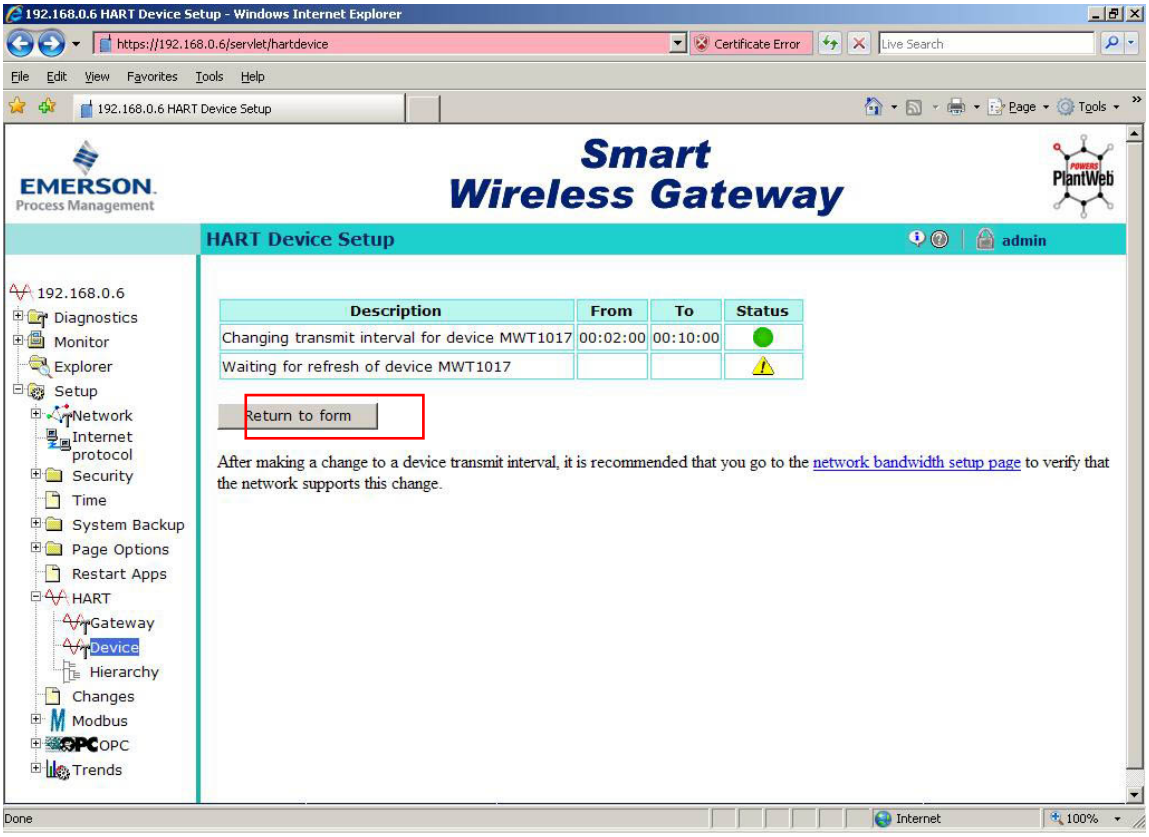
PV (Primary Variable): Metal Loss in mils or microns.
SV (Secondary Variable): Corrosion Rate in mils per year or microns per year.
TV (Tertiary Variable): Instrument Temperature in deg C.
QV (Quaternary Variable): Battery Voltage in Volts.

Note: The **SV** will vary depending on the amount of time the Corrosion rate interval is setup for. The HART status will turn green after the corrosion rate interval has been reached.

When all the MWT's show up with a green HART Status, you will now need to change the Burst Rate back to an interval of at least 10 minutes or more as noted in Chapter 4, Section 4b. From the left hand menu tree navigate to HART>Device. Highlight and then enter the new Burst Rate. Click Submit.



c. The following screen will appear. Click **Return to Form**.

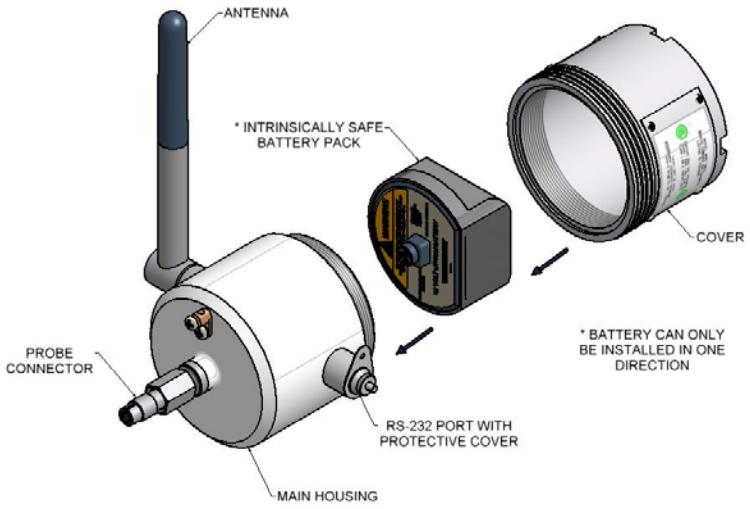


d. Click on “Explorer” from the left hand menu tree and wait for device(s) to show green status again. Status time will vary depending on the new Burst Rate applied.

Chapter 9
Physical Installation

Power Module Installation

Ensure that the Power Module is connected to the transmitter. Power Module (RCS P/N 748400) is intrinsically safe and may be connected/disconnected in a hazardous location.



Note:
Wireless devices should be powered up in order of proximity from the Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

Mount the Transmitter

The Microcor® Wireless Transmitter (MWT-3905) and all other wireless devices should be installed only after the Gateway has been installed and is functioning properly. Wireless devices should also be powered up in order of proximity from the Gateway, beginning with the closest. This will result in a simpler and faster network installation.

The Microcor® Wireless Transmitter can be installed on the top, side or bottom of the line according to the probe installation. Choose the best installation configuration that corresponds to the location of the probe.

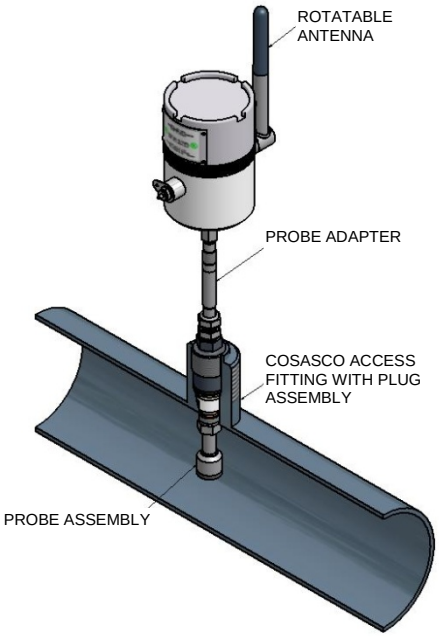
Grounding
An 8 to 14 AWG grounding wire can be attached to the transmitter at the grounding lug. Connect the ground wire to earth ground per local electrical code.

Note: Wireless devices should be powered up in order of proximity from the Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

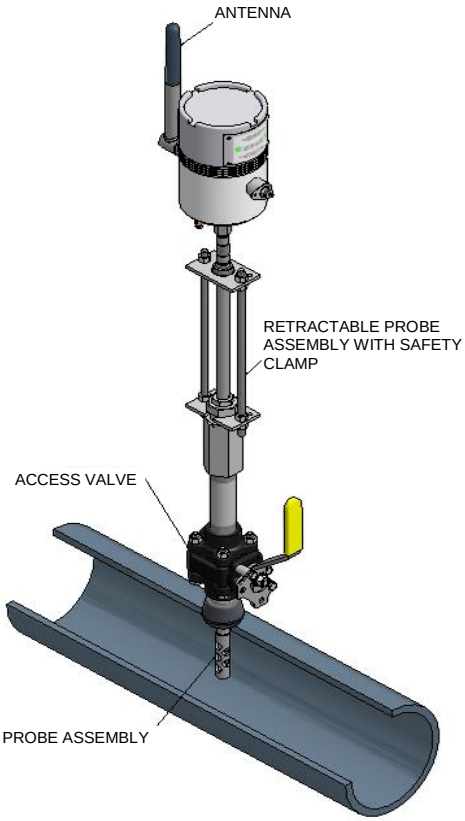
Direct Probe Mounting

Top of the Line

a. Attach connector and tighten connector nut to mount the transmitter to the probe adapter.
b. Rotate the antenna to vertical position.



MWT Mounted on a Cosasco Access Fitting With Retrievable Probe

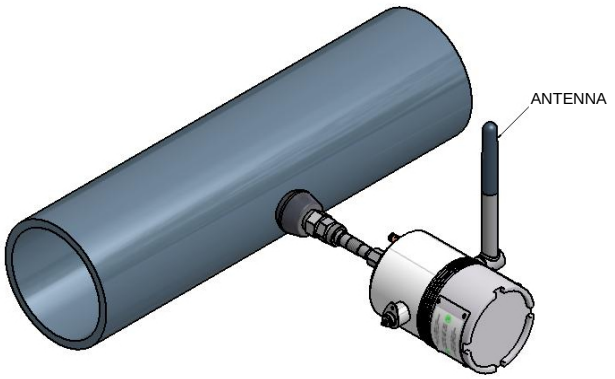


MWT With a Retractable Probe Assembly

Side of the Line

a. Attach connector and tighten connector nut to mount the transmitter to the probe adapter.

b. Rotate the antenna to vertical position.

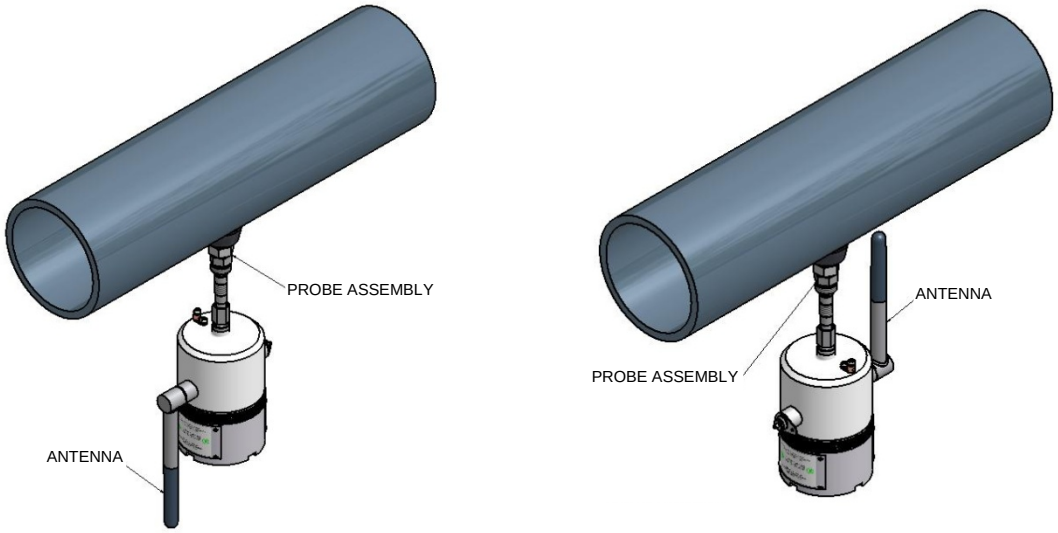


MWT With Fixed Probe Mounted on the Side of the Pipe

Bottom of the Line

a. Attach connector and tighten connector nut to mount the transmitter to the probe adapter.

b. Rotate the antenna to vertical position.



MWT Mounted on Underside of Pipe

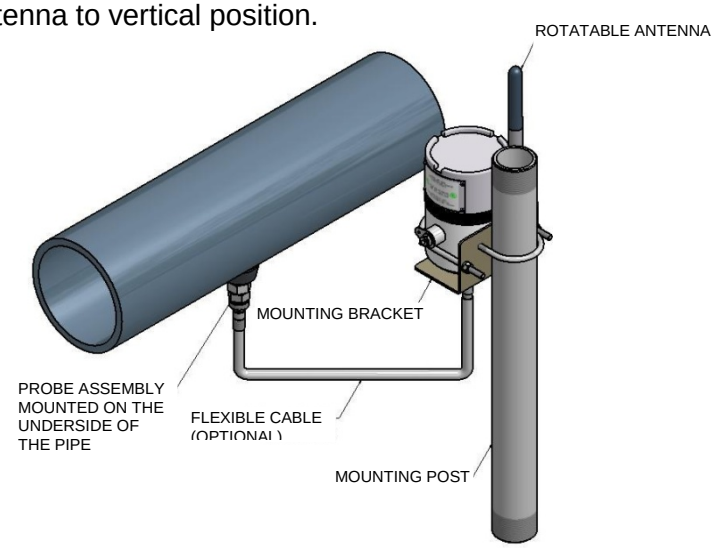
Optional Remote Mounting

(Bottom of the Line shown)

a. Secure the transmitter to the remote mounting post using appropriate accessories.

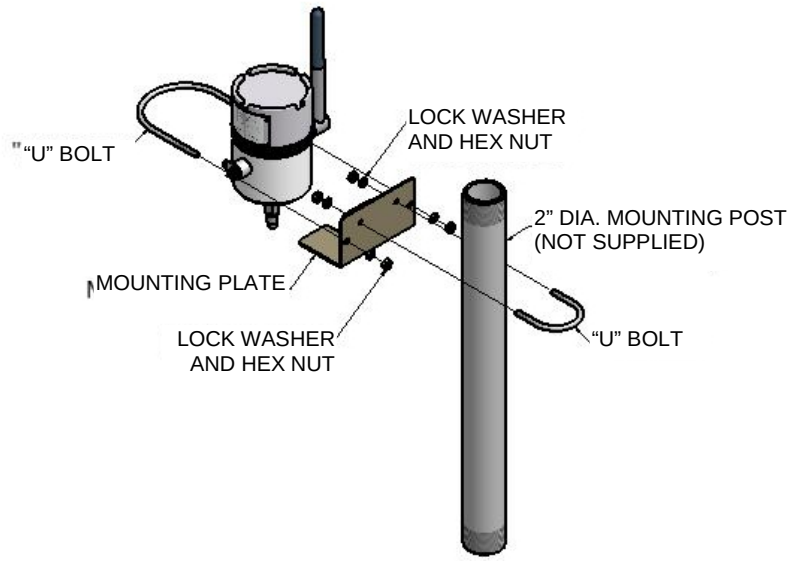
b. Attach connector and tighten connector nut of the optional flexible cable to the probe adapter and attach the other end to the transmitter.

c. Rotate the antenna to vertical position.



MWT Mounted in a Remote Location

RCS Mounting Accessories



Appendix A
Product Certifications

Product Name: Microcor® Wireless Transmitter
Model: MWT-3905

Approved Manufacturing Location
Rohrback Cosasco Systems, Inc. — Santa Fe Springs, California USA

European Union (EU) Directives

ATEX certification

FM 09 ATEX 0018X
Ex d [ib] Class I, Zone 1, IIC, T4, Ta = -40C to +70C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 702408 for instructions

ATEX Directive 94/9/EC

The MWT-3905 complies with the European ATEX Directive and the following standards:

EN 60079-0:2006, Electrical Apparatus for Explosive Gas Atmospheres – General Requirements
EN 60079-1:2007, Electrical Apparatus for Explosive Gas Atmospheres – Flameproof Enclosures “d”
EN 60079-11:2007, Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety “ i ”

Electromagnetic Compatibility Directive (EMC) 89/336/EEC, Amended 91/263/EEC, 92/31/EEC and 93/97/EEC

The MWT-3905 complies with the European EMC Directive and the following standards:

EN 61326-1:2006, Electrical Equipment for Measurement and Control
EN 61000-4-2:1995, A1:1998, A2:2001, EMC: Electrostatic Discharge Immunity
EN 61000-4-3:2006, A1:2008, EMC: Radiated Radio Frequency Immunity
EN 61000-6-4:2007, EMC Radiated Emissions
CISPR 11:2004, Industrial, Scientific, and Medical (ISM) Radio Frequency Equipment

Radio and Telecommunications Terminal Equipment Directive (R&TTE) 1999/S/EC

The MWT-3905 complies with the European R&TTE Directive and the following standards:

EN 300 328 V1.7.1:2006, ERM and EMC, Equipment Operating in the 2.4 GHz ISM Band
EN 301 489-1 V1.6:2005, ERM and EMC, Radio Equipment Common Technical Requirements
EN 301 489-17 V1.2.1:2002, ERM and EMC, Specific Conditions for 2.4 GHz Systems
EN 60950-1:2001, General Requirements

Operating cautions for the following countries:

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10 mW E.I.R.P.
Italy	If used outside of own premises, general authorization is required
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund
Romania	Use on a secondary basis. Individual license required

IEC Ex Certification

FM IEC Ex FMG 09-2004
IEC Ex d [ib], Class I, Zone 1, IIC, T4, Ta = -40C to +70C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 702408 for instructions

The MWT-3905 complies with the following IEC standards:

IEC 60079-0:2007, Electrical Apparatus for Explosive Gas Atmospheres – General Requirements
IEC 60079-1:2007, Electrical Apparatus for Explosive Gas Atmospheres – Flameproof Enclosures “d”
IEC 60079-11:2006, Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety “ i ”

Factory Mutual Approvals (FM Approvals) Certification

The Microcor Wireless Transmitter (MWT-3905) has been examined and tested to determine that the design meets basic electrical, mechanical and fire protection requirements by FM Approvals, a Nationally Recognized Testing Laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American Certifications

FM AEx d [ib] Class I, Zone 1, IIC, T4, Ta = -40C to +70C
FMc Ex d [ib] Class I, Zone 1, IIC, T4, Ta = -40C to +70C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 702408 for instructions

The MWT-3905 complies with the following North American standards:

ANSI/ISA 60079-0:2005, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: General Requirements

ANSI/ISA 60079-1:2005, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Location: Type of Protection Flameproof “d”
ANSI/ISA 60079-11:2005, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: Intrinsic Safety “ i ”

Federal Communications Commission (FCC) and Industry Canada (IC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation of 20 cm from all persons.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the radio frequency (RF) spectrum. Nearly every country requires this type of product certification. RCS is working with governmental agencies around the world to supply fully compliant products and to remove the risk of violating country directives or laws governing wireless device usage.

Appendix B
Certificates of Compliance

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS LOCATION ELECTRICAL EQUIPMENT
PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

MWT-3905 Microcor Wireless Transmitter.
I/1/Ex d [ib] IIC/T4 Ta = -40°C to +70°C; IP66

Equipment Ratings:

Flameproof with Intrinsically Safe outputs for use in Class 1, Zone 1 Hazardous (Classified) Locations

FM Approved for:

Rohrback Cosasco Systems
11841 East Smith Ave
Santa Fe Springs, CA 90670

6/07

3032790C
Page 1 of 2

FM Approvals

Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
ANSI/ISA 60079-0	2005
ANSI/ISA 60079-1	2005
ANSI/IEC 60529	2004
ANSI/ISA 60079-11	2006

Original Project ID: 3032790 Approval Granted: October 1, 2009

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date

FM Approvals LLC

J.E. Marquedant

J.E. Marquedant
Group Manager, Electrical

1 October 2009
Date

Appendix C
Manufacturer's Declaration of Conformity

Product Name: Microcor Wireless Transmitter
Model: MWT-3905

Approved Manufacturing Location
Rohrback Cosasco Systems, Inc. — Santa Fe Springs, California USA

European Union (EU) Directives

ATEX certification

FM 09 ATEX 0018X
Ex d [ib] Class I, Zone 1, IIC, T4, Ta = -40C to +70C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 702408 for instructions

ATEX Directive 94/9/EC

The MWT-3905 complies with the European ATEX Directive and the following standards:

EN 60079-0:2006, Electrical Apparatus for Explosive Gas Atmospheres – General Requirements
EN 60079-1:2007, Electrical Apparatus for Explosive Gas Atmospheres – Flameproof Enclosures "d"
EN 60079-11:2007, Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety " i "

Electromagnetic Compatibility Directive (EMC) 89/336/EEC, Amended 91/263/EEC, 92/31/EEC and 93/97/EEC

The MWT-3905 complies with the European EMC Directive and the following standards:

EN 61326-1:2006, Electrical Equipment for Measurement and Control
EN 61000-4-2:1995, A1:1998, A2:2001, EMC: Electrostatic Discharge Immunity
EN 61000-4-3:2006, A1:2008, EMC: Radiated Radio Frequency Immunity
EN 61000-6-4:2007, EMC Radiated Emissions
CISPR 11:2004, Industrial, Scientific, and Medical (ISM) Radio Frequency Equipment

Radio and Telecommunications Terminal Equipment Directive (R&TTE) 1999/S/EC

The MWT-3905 complies with the European R&TTE Directive and the following standards:
EN 300 328 V1.7.1:2006, ERM and EMC, Equipment Operating in the 2.4 GHz ISM Band
EN 301 489-1 V1.6:2005, ERM and EMC, Radio Equipment Common Technical Requirements

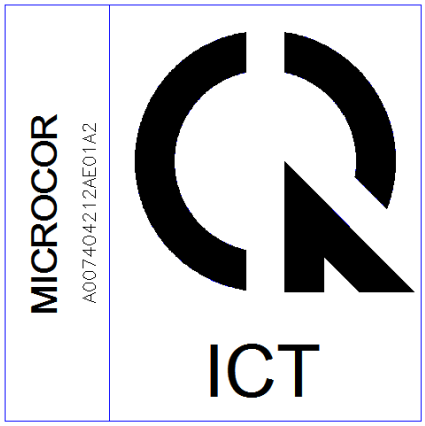
EN 301 489-17 V1.2.1:2002, ERM and EMC, Specific Conditions for 2.4 GHz Systems
EN 60950-1:2001, General Requirements

Operating cautions for the following countries:

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10 mW E.I.R.P.
Italy	If used outside of own premises, general authorization is required
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund
Romania	Use on a secondary basis. Individual license required

Country Approvals

Vietnam:



IEC Ex Certification

FM IEC Ex FMG 09-2004
IEC Ex d [ib], Class I, Zone 1, IIC, T4, Ta = -40C to +70C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 702408 for instructions

The MWT-3905 complies with the following IEC standards:

IEC 60079-0:2007, Electrical Apparatus for Explosive Gas Atmospheres – General Requirements
IEC 60079-1:2007, Electrical Apparatus for Explosive Gas Atmospheres – Flameproof Enclosures “d”
IEC 60079-11:2006, Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety “ i ”

Factory Mutual Approvals (FM Approvals) Certification

The Microcor Wireless Transmitter (MWT-3905) has been examined and tested to determine that the design meets basic electrical, mechanical and fire protection requirements by FM Approvals, a Nationally Recognized Testing Laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American Certifications

FM AEx d [ib] Class I, Zone 1, IIC, T4, Ta = -40C to +70C
FMc Ex d [ib] Class I, Zone 1, IIC, T4, Ta = -40C to +70C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 702408 for instructions

The MWT-3905 complies with the following North American standards:

ANSI/ISA 60079-0:2005, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: General Requirements
ANSI/ISA 60079-1:2005, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Location: Type of Protection Flameproof “d”
ANSI/ISA 60079-11:2005, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: Intrinsic Safety “ i ”

Federal Communications Commission (FCC) and Industry Canada (IC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation of 20 cm from all persons.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the radio frequency (RF) spectrum. Nearly every country requires this type of product certification. RCS is working with governmental agencies around the world to supply fully compliant products and to remove the risk of violating country directives or laws governing wireless device usage.

Place and Date of Issue:

January 29, 2010
Rohrback Cosasco Systems, Inc.
Santa Fe Springs, CA 90670

Authorized Signature:
Steven L. Stricklin Quality Assurance Manager

Appendix D
Manufacturer's Declaration of Conformity

Product Name: Corrater Wireless Transmitter
Model: CWT-9020

Approved Manufacturing Location
Rohrback Cosasco Systems, Inc. — Santa Fe Springs, California USA

European Union (EU) Directives

ATEX certification

Sira 12ATEX1151

II 2 G Ex d [ib], IIC, T4, Gb, Ta = -40°C to +70°C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 710932 for instructions

ATEX Directive 94/9/EC

The CWT-9020 complies with the European ATEX Directive and the following standards:

EN 60079-0:2006, Electrical Apparatus for Explosive Gas Atmospheres – General Requirements
EN 60079-1:2007, Electrical Apparatus for Explosive Gas Atmospheres – Flameproof Enclosures "d"
EN 60079-11:2012, Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety " i "

Electromagnetic Compatibility Directive (EMC) 89/336/EEC, Amended 91/263/EEC, 92/31/EEC and 93/97/EEC

The CWT-9020 complies with the European EMC Directive and the following standards:

EN 61326-1:2006, Electrical Equipment for Measurement and Control
EN 61000-4-2:2008, A1:1998, A2:2001, EMC: Electrostatic Discharge Immunity
EN 61000-4-3:2006, A1:2008, EMC: Radiated Radio Frequency Immunity
EN 61000-6-4:2007, EMC Radiated Emissions
CISPR 11:2004, Industrial, Scientific, and Medical (ISM) Radio Frequency Equipment

Radio and Telecommunications Terminal Equipment Directive (R&TTE) 1999/S/EC

The CWT-9020 complies with the European R&TTE Directive and the following standards:

EN 300 328 V1.7.1:2006, ERM and EMC, Equipment Operating in the 2.4 GHz ISM Band
EN 301 489-1 V1.6:2005, ERM and EMC, Radio Equipment Common Technical Requirements
EN 301 489-17 V1.2.1:2002, ERM and EMC, Specific Conditions for 2.4 GHz Systems
EN 60950-1:2001, General Requirements

Operating cautions for the following countries:

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10 mW E.I.R.P.
Italy	If used outside of own premises, general authorization is required
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund
Romania	Use on a secondary basis. Individual license required

IEC Ex Certification

IECEx SIR 12.0059
Ex d [ib], IIC, T4, Gb, Ta = -40°C to +70°C
Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 710932 for instructions

The CWT-9020 complies with the following IEC standards:

IEC 60079-0:2011, Electrical Apparatus for Explosive Gas Atmospheres – General Requirements
IEC 60079-1:2007-04, Electrical Apparatus for Explosive Gas Atmospheres – Flameproof Enclosures “d”
IEC 60079-11:2011-06, Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety “ i ”

CSA International (CSA) Certification

The Corrater Wireless Transmitter (CWT-9020) has been examined and tested to determine that the design meets basic electrical, mechanical and fire protection requirements by CSA, a Nationally Recognized Testing Laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American Certifications

Enclosure: IP66
For use only with Power Module P/N 748400
See Installation Drawing 710932 for instructions

The CWT-9020 complies with the following North American standards:

CAN/CSA 60079-0:2011, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: General Requirements
CAN/CSA 60079-1:2011, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Location: Type of Protection Flameproof “d”
CAN/CSA 60079-11:2011, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: Intrinsic Safety “ i ”
ANSI/UL 60079-0 Fifth Edition, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: General Requirements
ANSI/UL 60079-1Sixth Edition, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Location:Type of Protection Flameproof “d”
ANSI/UL 60079-11 Fifth Edition, Electrical Apparatus for use in Class I, Zones 0, 1, and 2 Hazardous Locations: Intrinsic Safety “ i ”

Federal Communications Commission (FCC) and Industry Canada (IC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation of 20 cm from all persons.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the radio frequency (RF) spectrum. Nearly every country requires this type of product certification. RCS is working with governmental agencies around the world to supply fully compliant products and to remove the risk of violating country directives or laws governing wireless device usage.

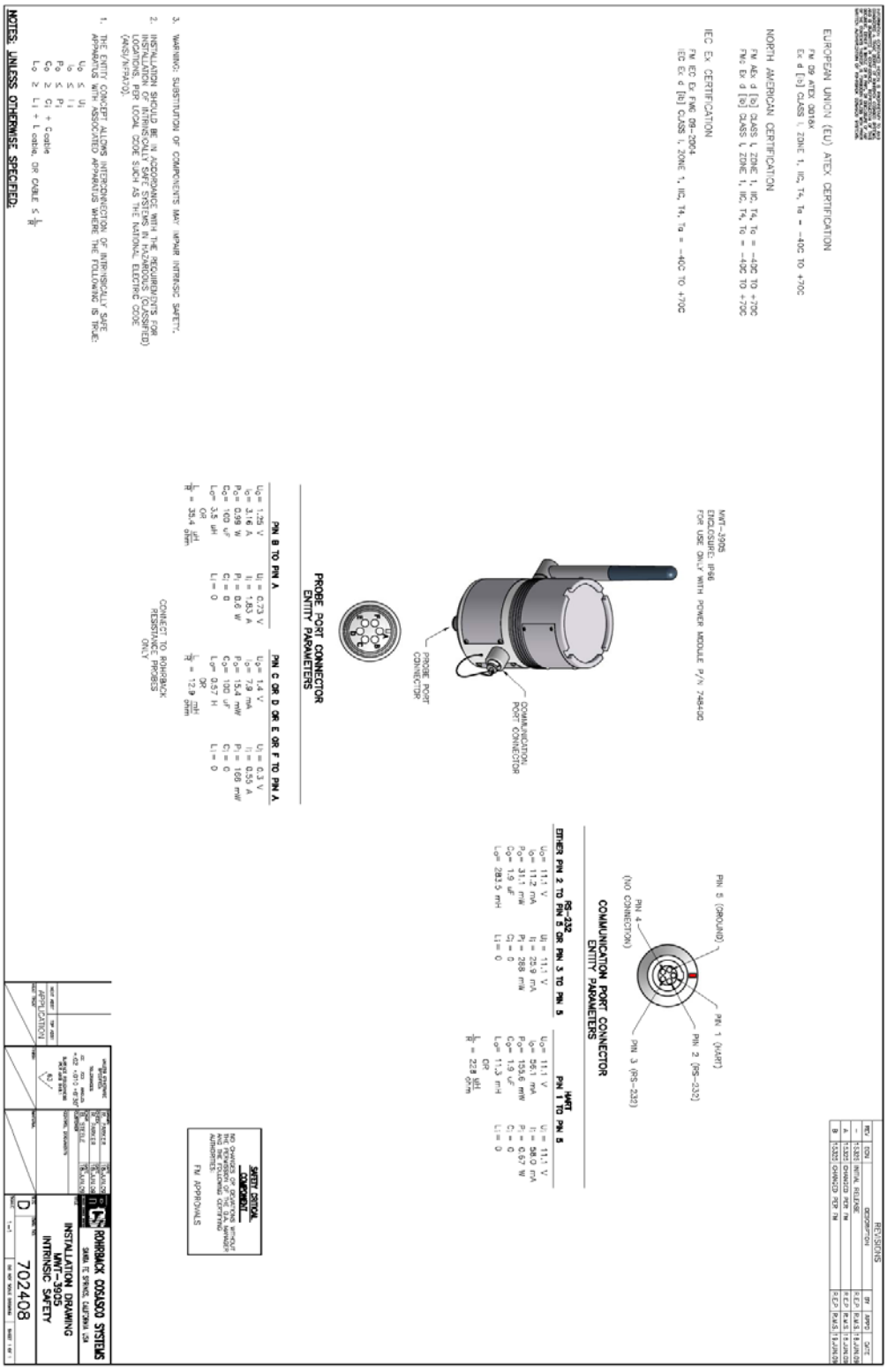
Place and Date of Issue:

October 17, 2012
Rohrback Cosasco Systems, Inc.

Santa Fe Springs, CA 90670

Authorized Signature: _____
Steven L. Stricklin Quality Assurance Manager

Appendix E
Drawing 702408


REVISIONS
REV DCN DESCRIPTION BY APPD DATE
- 13451 INITIAL RELEASE K.E.P. R.A.S. 11-JAN-06
A 13451 CHANGED PER TM K.E.P. R.A.S. 11-JAN-06
B 13451 CHANGED PER TM K.E.P. R.A.S. 11-JAN-06
EUROPEAN UNION (EU) ATEX CERTIFICATION
FM 09 ATEX 0018X
Ex d [ia] CLASS I, ZONE 1, IIC, T4, Ta = -40C TO +70C
NORTH AMERICAN CERTIFICATION
FM AEx d [ia] CLASS I, ZONE 1, IIC, T4, Ta = -40C TO +70C
FM: Ex d [ia] CLASS I, ZONE 1, IIC, T4, Ta = -40C TO +70C
IEC Ex CERTIFICATION
FM IEC Ex FMG 09-0004
IEC Ex d [ia] CLASS I, ZONE 1, IIC, T4, Ta = -40C TO +70C
MNT-3905
ENCLOSURE: IP66
FOR USE ONLY WITH POWER MODULE P/N 748426
COMMUNICATION PORT CONNECTOR
PROBE PORT CONNECTOR
PIN 5 (GROUND)
PIN 1 (HART)
PIN 2 (RS-232)
PIN 4- (NO CONNECTION)
PIN 3 (RS-232)
COMMUNICATION PORT CONNECTOR ENTITY PARAMETERS
RS-232 EITHER PIN 2 TO PIN 5 OR PIN 3 TO PIN 5
Ui= 11.1 V
Ii= 25.9 mA
Pi= 288 mW
Ci= 0
Li= 0
HART PIN 1 TO PIN 5
Ui= 11.1 V
Ii= 98.0 mA
Pi= 0.67 W
Ci= 0
Li= 0
Uo= 11.1 V
Io= 56.1 mA
Po= 155.6 mW
Co= 1.9 uF
Lo= 11.3 mH
GP
Ra = 228 ohm
PROBE PORT CONNECTOR ENTITY PARAMETERS
PIN B TO PIN A
Uo= 1.25 V
Io= 3.16 A
Po= 0.99 W
Co= 160 uF
Lo= 3.5 uH
Ra = 35.4 ohm
Ui= 0.73 V
Ii= 1.83 A
Pi= 0.6 W
Ci= 0
Li= 0
PIN C OR D OR E OR F TO PIN A
Uo= 1.4 V
Io= 7.9 mA
Po= 15.4 mW
Co= 100 uF
Lo= 0.57 H
Ra = 12.9 ohm
Ui= 0.3 V
Ii= 0.55 A
Pi= 165 mW
Ci= 0
Li= 0
CONNECT TO ROHRBACK RESISTOR ONLY PROBES
SAFETY CRITICAL COMPONENT
NO CHANGES OF ANY KIND TO BE MADE TO THIS DRAWING WITHOUT PRIOR WRITTEN APPROVAL FROM THE FOLLOWING CERTIFYING AUTHORITIES:
FM APPROVALS
1. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHERE THE FOLLOWING IS TRUE:
Uo ≤ Ui
Io ≤ Ii
Po ≤ Pi
Co ≥ Ci + Ccable
Lo ≥ Li + Lcable, OR Ra ≤ R
2. INSTALLATION SHOULD BE IN ACCORDANCE WITH THE REQUIREMENTS FOR INSTALLATION OF INTRINSICALLY SAFE SYSTEMS IN HAZARDOUS (CLASSIFIED) LOCATIONS, PER LOCAL CODE SUCH AS THE NATIONAL ELECTRIC CODE (ANSI/NFPA70).
3. WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
NOTES: UNLESS OTHERWISE SPECIFIED:
ROHRBACK COSASCO SYSTEMS
SANTA FE SPRINGS, CALIFORNIA USA
INSTALLATION DRAWING
MNT-3905
INTRINSIC SAFETY
D
702408
SHEET 1 of 1
NEXT ASSY
USED ON
APPLICATION